ELECTRICAL WEST

WITH WHICH IS CONSOLIDATED THE JOURNAL OF ELECTRICITY

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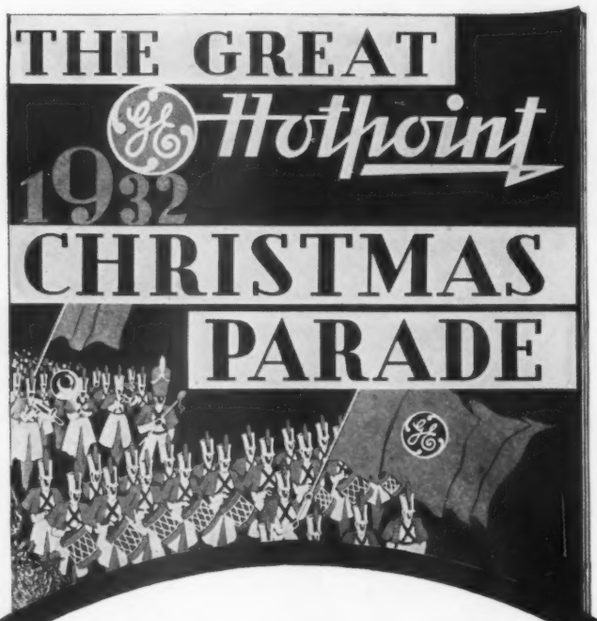

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GENERAL ELECTRIC

ELECTRIC Hotpoint RANGE

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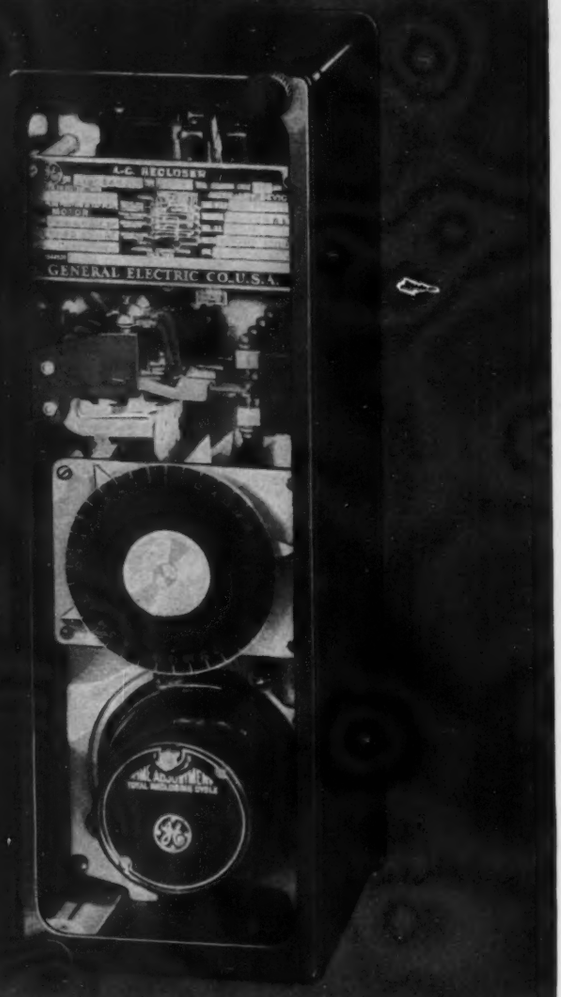
RECLOSING RELAY



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Increases Efficiency
Lowers Operating Costs
Improves the Service
Reduces Operating Hazards
Conserves Stored Water
Lessens Maintenance Costs
Puts MEN to WORK

MANY opportunities are offered for improving the operating characteristics of the older hydroelectric plants, their rehabilitation costs being rapidly absorbed even in these times of lowered power demand. P. C. E. A. committee reports show specific instances where economies have been effected through increased unit output, reduced operating costs, simplified control, and better regulation, all of which contribute to system efficiency.

The capital investment is relatively small and at its lowest point with the prevailing prices for labor and materials. Moreover plants can now be more easily removed from service—to be made ready for the heavier demands that are sure to come. Pelton engineers are readily available for discussion of rehabilitation plans.

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This Rubber Covered "Code" is made to give *lasting* service—not to minimum Underwriter's requirements. You can install it with the assurance that it provides an extra margin of safety and dependability.

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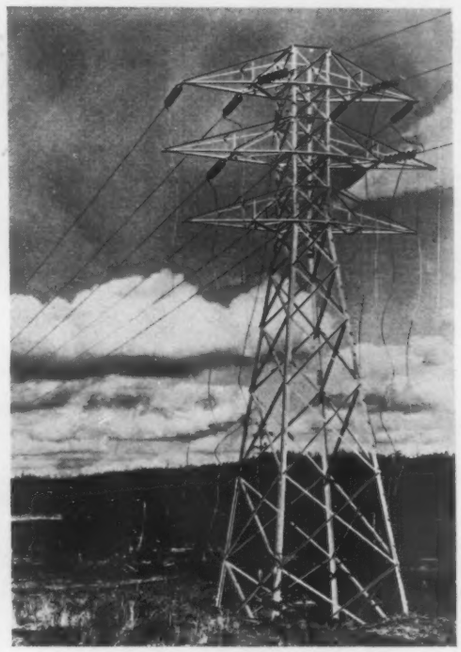

105-ft. 4-circuit Transmission Tower. 60-Kv. Power Line in Process of Erection for Western Washington Electric Light & Power Co.

Steel is the logical material for transmission structures. It offers economy in erection and maintenance, and dependability in service. Steel insures a degree of safety and of freedom from the possibility of service interruptions that cannot be obtained with any other material.

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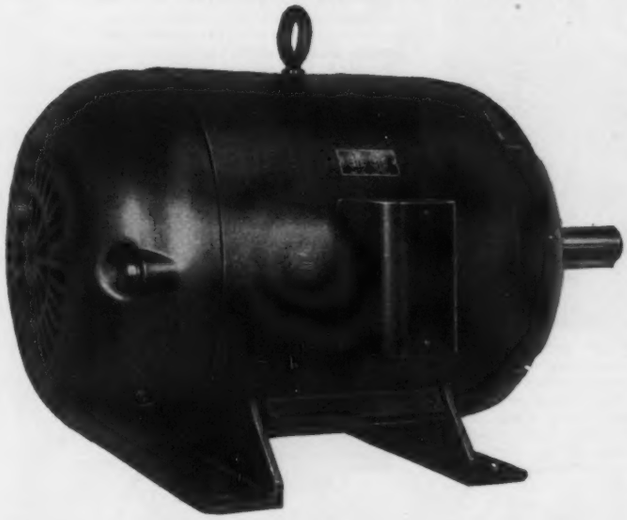
Economize

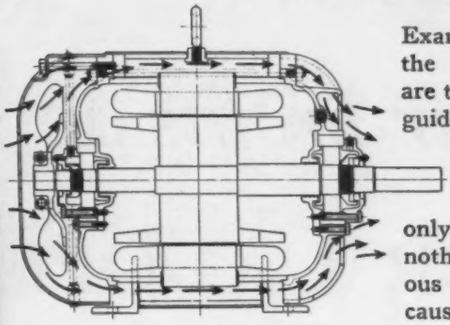
with Wagner Type CP (Totally-Enclosed Fan-Cooled) Motors



Each Wagner CP motor is a one-time investment, with no subsequent upkeep other than that of periodic greasing — because the motor is TOTALLY ENCLOSED against the entrance of dust, filings, fumes, moisture and other troublesome matter.

Where Wagner CP motors are used, economy in motor operation is at its maximum—because they eliminate (1) shut-downs for the removal of abrasive and clogging dust, (2) replacement of corroded and short-circuited windings, and (3) special housings for protection against corrosive gases, steam and moisture.

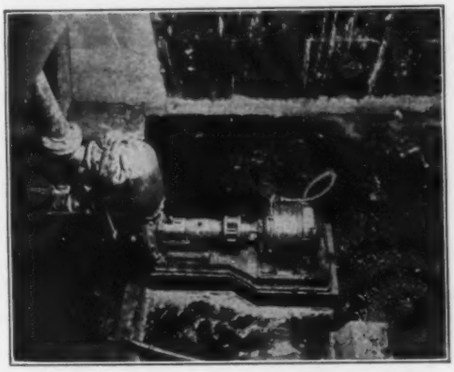
More and more plant managers are realizing that motor protection costs less than motor maintenance —that no open-type motor should be expected to operate where dust, fumes, gases and moisture prevail.



Examine the Wagner CP. As the drawing illustrates, there are two frames, an outer which guides a strong cooling draft over the motor, and an inner frame with clearances around the shaft only, clearances thru which nothing obstructive or injurious can get into the motor because of seals and lubricant.

ABRASIVE DUST is the bane of foundries, destructive to open-type motors, but harmless where Wagner CP motors are installed. Here is a Wagner CP operating a conveyor in a large foundry. It is in a pit, remotely controlled, forgotten between greasings. No unnecessary maintenance here.

All tests have proved these motors to be qualified for safe and dependable operation where the use of open-type motors would entail frequent shut-downs to clean out motors, curtailed production, and extra hours of overtime. Even soapstone dust has been tried, and there was no clogging.



CORROSION would require motor replacement within a year in this recovery pit. The solution handled is 27% sulphuric acid, and the Wagner CP now on this pumping job runs 24 hours day after day with no other attention than that of periodic greasing. It would cost $60 per year to keep an open-type motor in this pit—or a new motor each year if not rebaked and revarnished repeatedly.

Wagner Electric Corporation

Saint Louis, U.S.A.

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6381 Plymouth Ave., St. Louis Mo.

Please send complete information on Wagner type CP totally-enclosed fan-cooled motors.

Name and Position

Company

Address

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PRESTON S. ARKWRIGHT,
President, Georgia Power Company

"A good product, the constantly increasing public acceptance of cooking the electrical way and a policy of practical co-operation from the power company has made the electric range one of our most important sales items. The recent formation of the National Electric Cookery Council should have a further stimulating effect."

E. L. STREETER,
Streeter Electric Store, Inc.
Greenfield, Mass.

"The three-year Range Program offers an unparalleled opportunity to the contractor-dealer. House wiring alone, it is estimated, will bring a gross business of $43,000,000. We want this business. We can get it by industry co-operation with the power companies and all other local interests who profit by Range sales."

L. E. MAYER, *President,*
National Electrical Contractors Assn.

Your profits depend on YOUR CO-OPERATION

THE basic idea of the National Electric Cookery Campaign is to broaden the market and speed up the sale of electric ranges *through the development of dealer outlets.*

Your place in this picture is vital and necessary. Only with dealer co-operation—with your help locally—can the National Plan to sell a million ranges in three years, be successful.

Local Cookery Council will pave way to profitable *sales . . . for you*

Under the sponsorship of the Local Cookery Council, all the forces in your locality that CAN co-operate will be mobilized in a united drive for Electric Cookery.

Here at last is a concrete thing to co-operate about.

By standardizing practices and by establishing policies to fit LOCAL conditions, the Local Council provides a focal point for initiating all merchandising activities on a uniform basis. Through it you can most effectively stimulate range buying. By co-ordinating selling and demonstration efforts, the Local Council multiplies many times the best any member of a group can do operating individually. You can't do the job alone.

Scores of women in your community are going to buy electric ranges as a matter of course—if you want to *substantially increase* this business—and get a real share yourself, get together with the Local Power Company and with the other dealers and contractors in your community. Act now. Do your share in organizing the Local Council first of all.

"The Plan Book" outlines a comprehensive program for the formation of your Local Council. Send for your copy. Write direct to national headquarters—National Electric Cookery Council, 420 Lexington Avenue, New York City.

WOMAN'S NEW VICTORY · ELECTRIC COOKERY ·

NATIONAL ELECTRIC COOKERY COUNCIL

Sponsored by National Electric Light Association and National Electrical Manufacturers Association

SALES UP

Over 50%

Frigidaire's Business Improvement Program brings increasing profits

•

September domestic sales by Public Utilities up over 50% over August —*in dollars and cents!* That's the result at the end of the first month of Frigidaire's Business Improvement Program . . . a result that is all the more gratifying when you consider that September sales are normally 10% *less* than August.

The announcement of a new low price and the support of an aggressive advertising campaign were factors in producing more business in September, but we believe that one of the most important reasons for the especially fine showing made by Public Utilities is the increasing use of the Individualized Sales Service. The use of this service by Utilities increased 100 per cent in 1932 over 1931.

Here are the first five steps in Frigidaire's *Business Improvement Program*—that are *Bringing Increasing Profits* to Public Utilities and other Frigidaire Dealers:

1. New low price—$112.00 (plus freight) with Federal Tax Paid—the lowest price at which a *Genuine** Frigidaire has ever been sold.
2. A revolutionary development—STATAFLEX—which gives ¼ more food space in the same sized cabinet.
3. Half-million dollar advertising campaign—concentrated in 90 days' time.
4. A new type of Demonstration Book, especially written for fall and winter selling to make it easier to close Frigidaire orders.
5. And for Utilities—the Individualized Sales Service to fit the needs of each company.

The success of Frigidaire's Business Improvement Program proves that Good Business is back for those who back Good Business . . . Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, Ohio.

• • •

**Warning!* A cheap, underpowered and poorly constructed refrigerator at any price is expensive for you to sell. Customer satisfaction—your greatest asset—is assured with this genuine Frigidaire. Nothing has been "cheapened"—it is the same Super-Powered, two cylinder Frigidaire made and guaranteed by Frigidaire Corporation, a subsidiary of General Motors.

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Anaconda makes all

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types of Power Cables *and submarine*

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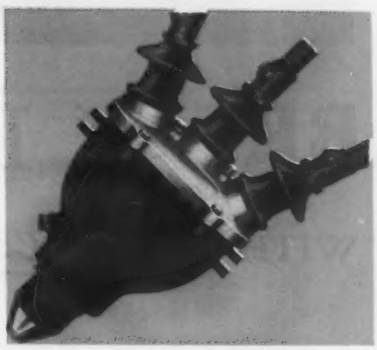
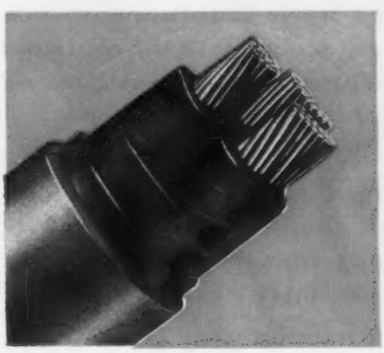


Cable Accessories



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These losses are no longer necessary. The new Westinghouse Surge-Proof Distribution Transformers eliminate them. Built-in Three-Point Protection prevents lightning from harming the transformers or blowing primary fuses.

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The Westinghouse Surge-Proof transformer will help you reduce distribution costs by eliminating service interruptions, trouble-shooting expense and damage to equipment caused by lightning-struck transformers and lightning-blown fuses.

For complete information about Surge-Proof transformers, simply mail the coupon.

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ELECTRICAL WEST

With which is consolidated the Journal of Electricity
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Volume 69
Number 5

G. C. TENNEY, *Editor*

Editorial

The Industry Should Lead In Industrial Modernization

AIMING at industrial modernization as a field which will contribute quickly and definitely to acceleration of business and employment, the Committee on Industrial Rehabilitation has developed a national program to replace obsolete machinery, equipment and plant facilities throughout industry. Manifestly, here is a standard around which the electrical industry can rally for business development because industrial modernization, viewed in any light, is bound to involve electrification.

Objective of the program is to modernize a fair proportion of the 55 per cent of present equipment of industry that has outlived its usefulness. Normal replacements and improvements largely have been neglected through the past three years, and actual studies show that in excess of $5 billions of equipment that normally would have been replaced has not been purchased at all.

Divorced of uplift and altruism, the program presents evidence of the advisability of modernization in hard-boiled terms of self-interest. Economic salvation for industry will not be forthcoming so long as obsolesence of equipment and machinery imperils ability to meet competition, increases expenses and cuts profits. That is sound logic to which any industrial manufacturer will give heed. Furthermore, modernization undertaken today will act like a pebble dropped in a pool, starting wide circles of business and employment in tributary industries, which will extend ultimately to the producer of raw materials and to the farm.

Here is a program to which the electrical industry can turn with zeal. Opportunity for leadership exists both on the giving and receiving ends, for the electrical industry is not above a fair measure of modernizing itself. Three years of unabated ingenuity and invention have brought forth many technological improvements that can be applied economically and efficiently to the production and distribution of electricity, itself. Specific data proving the economic value of rehabilitation right now is available for all industries.

Plans for the accomplishment of the job outlined by the Committee on Industrial Rehabilitation have been laid out on broad geographic lines. The electrical industry as a unit should participate actively in the local committees. Self-interest dictates such a course, and the reward promises to be in proportion to the effort expended.

Home Modernization Is a Logical Market

PARTICIPATION in the modernization movement on the part of the electrical industry need not stop with factories. Of almost equal proportions is the market for electrical equipment, appliances and supplies in the modernization of the home. Pointed remarks have been made in these columns of the opportunities that exist in rewiring alone in the domestic field. Resultant comment has been that sales obstacles are so great that home rewiring itself cannot be sold profitably.

Suppose, however, that rewiring was coupled with a program designed to modernize both kitchen and laundry, or with completely relighting the home? Two or more birds then would have been killed with one stone. Such programs are meeting with success in various Eastern localities. In one city, particularly, an organization has been perfected which will modernize any kitchen or laundry at a fixed lump contract price, payable over a reasonable term of years. In this

case, modernization includes any or all of the appliances from range or refrigerator to washer and ironer, with a modern kitchen cabinet, new linoleum and fresh paint thrown in for good measure.

Some such plan as this can be worked out co-operatively for almost any community. Certainly the potentialities of the home modernization market warrant a plan of action.

FOR a long time we have had the feeling that there are too many people in organizations with the authority to say "no" to a suggestion or a sales argument, and that this authority too frequently is exercised. A. W. Robertson of Westinghouse points to this danger. He says, "We should all be careful when we say 'no' to a suggested improvement or plan made by a subordinate. A 'no' in most cases is final. There is no appeal from it. On the other hand, if we say 'yes,' the matter usually comes up for review by other superior officers, which gives such suggestion the advantage of having several officers review it. We are usually more careful when we say 'yes' because we know that our 'yes' decisions will have to stand the test of performance or further approval. As a matter of fact, we should be more careful with our 'noes' for the very reason that they do not have to stand the test of performance or further approval."

The Tumult and The Shouting Die

BY THE time this number reaches all its readers, the election will be over for another four years. The extent to which the American voters have reacted, and the direction thereof, will have been made evident. The electrical industry will be able to take stock of its prospects, either under the definite position of Hoover or the more intangible generalizations of Roosevelt. If the latter is our next president, there still will remain to be defined the details of his declarations and the extent of his influence in making them effective. Analysis of the eight-point declaration at Portland reveals nothing that any self-respecting power company has not already done or is willing to do under fair and intelligent regulation.

Whatever the outcome of the election, the power companies are not yet free to breathe without concern for the future. There is a long road ahead of them to outlive the apprehension which the Foshay and Insull over-expansions and collapses have generated in the investing public. The cry of the martyr-complex intelligentsia for the utopia of unregulated, unrestrained government ownership still is resounding from one end of the land to the other. There still are newspapers whose own fortunes, whose own initiative, are to be served by championing the "downtrodden," the "forgotten man." There still are internal trade problems whose bile sometimes overflows and embitters an otherwise satisfied, or at least complacent, community.

The tumult and the shouting of the election die. The pressure of uncertainty as to which candidates will be elected is relieved, to be sure. But the work of making impossible any future Insull stigma upon the good name of the industry, the restoration of good repute and of respect, the alleviation of the causes for trade misunderstanding and rancor, the building up of resistance to the infections of malcontent and theorist, the outselling of the newspapers as to the ultimate public benefit from private ownership,—all these are yet to be done.

Let the captains and the kings depart to the tasks ahead of them. The industry has its own troops to muster, its own battles yet to win.

WRITING to his division sales superintendents about the statements by executives published in the October issue under the heading "The Industry Looks at the Future," a sales manager says, " . . . . each and every employee of our company, particularly the members of the sales organization, should read each and every one of these comments by these leaders of our industry here in the West. A discussion of them in one or more sales meetings should engender enthusiasm and optimism in our organization." We get such a kick out of the statements that we have read them on the average of twice a week, too.

Gold Bricks Reappear With New Trimmings

IN THE long, dragging, reconstruction years after the Civil War, the carpet baggers, the gold brick peddlers, the shell game artists and the men who sold the Brooklyn Bridge at bargain prices, flourished. Perhaps there is something about adversity which kindles human hope for miracles, for some magic wand method of accom-

plishing the impossible. When hard work and other realities,—the only roads up into the economic sunshine again—are so unenticing, the yearn for "something for nothing" grows.

It is just such times that the harpies of the human race select for preying upon those who should know better. In such times emerge the slickers. Men whose faith in established institutions and the stability of governments has been shaken are vulnerable to the siren call of an easier or cheaper way.

Manifestations of this new gullibility appear in every phase of activity. The election which swings toward a new or radical candidate just for the sake of a change is one manifestation. The willingness of city councils to listen seriously to glamorous proposals for self-liquidating, tax-annihilating municipal ownership schemes is another. The gas engine that is promised as the savior of the farmer from the toils of the power company is still another gold brick. The trick reflector which will shave the electric bill by at least half, or more, and the undervoltage lamp which burns so brightly in comparison to the standard lamps, are the new shell game. Lethal water heaters that are supposed to heat up a bathtub full of water from a lamp socket are some of the criminal expressions of this predacity.

Unfortunately, the electrical industry, in combating this scourge, has a double difficulty before it: first, to convince the public as to its own integrity and, second, to show the fallacies underlying the appeal of these blandishments. Perplexity and doubt contribute to the reception of the smooth-tongued patter of this new generation of confidence men. Every counter attack is easily interpreted to a discouraged and harassed consumer as a deliberate deception. By so doing, it is so easy to distract the attention while the pea is being slid to another shell.

The Commercial Section of the Pacific Coast Electrical Association, in its conclave last month, decided upon a militant resistance to the commercial rackets, the gold bricks of lighting and power equipment sold under such auspices. The industry has too much at stake to be passive. Every lighting reflector, every engine sold to a customer by such methods, has been sold at the expense of confidence in the power company, the reliable manufacturer, wholesaler and contractor. In order to have sold the "gold brick," the snide salesman has had to sell his victim the thought that he has been bilked and robbed previously. Not load alone, but public confidence and respect are endangered by this fraudulence.

Every force of education, of publicity, of personal influence, should be brought to bear upon this new danger to the industry.

COMMENTING on whether the Electragists' newly-declared militant policy was just the right thing, one contractor, after listening to the discussion for some time, summed it up thus: "It looks as though we have to fight for an opportunity to cooperate."

Air Conditioning Industry Needs Organization

DESIRE and necessity sell goods; air conditioning, like any other product, has been and will be sold because of these two human reactions. The public doesn't understand air conditioning, but it does understand the need for and advantages of conditioned air, and so air conditioning has public sympathy and acceptance.

But public sympathy is a peculiar thing; it is just one error removed from public wrath. That very lack of public understanding may be air conditioning's undoing, for it makes possible the foisting upon the public of unscientific solutions of the scientific problem. It opens the way for the sale of equipment for which extravagant claims are made, but which is wholly unsuited to the job. Already, ordinary humidifiers are being advertised and sold as the answer to any air conditioning need. Already, cheap products which are not even good humidifiers are being sold at bargain prices as air conditioners. The public cannot be fooled for long.

Air conditioning represents too valuable a market to endanger by lack of public understanding. "It cries out," says "Printers' Ink," "for cooperative advertising that will cut through the maze of conflicting competitive claims and present the basic story of air conditioning to the millions." There is need to educate the public in the fundamentals of the theory, and in the recognition of the equipment that will do this part of the whole job or that part. There is need for deliberate guidance, if air conditioning is to be free from inflation.

It is significant that an air conditioning society already has been formed in San Francisco, that its members are learning all possible about the theory, the products and the market. More local societies, and even a strong, active national trade association, are a need of the moment. If electric refrigeration and electric cookery, each with vastly simpler problems, found organization profitable, air conditioning faces a sorry future without one.

Crossing the Columbia at 115 Kv.

First Submarine Oil-Filled Cable in the U. S.

In Bringing Energy From Ariel Plant of Inland Power and Light Co. to Portland, Ore., the Northwestern Electric Co., Pioneers in a New Transmission Development and Solves Installation and Operating Problems Connected Therewith*

By E. F. PEARSON,[1] G. B. SHANKLIN,[2] W. R. BULLARD,[3] *and* S. B. CLARK[1]

DELIVERY of energy from the new Ariel plant of the Inland Power & Light Co. on the Lewis River in Washington to the load center of the Northwestern Electric Co., in Portland, Ore., required the construction of approximately 36 mi. of transmission line. Transmission construction problems were complicated by the necessity for crossing the Columbia River, a large stream subject to wide variation in flow and carrying large amounts of marine commerce.

The use of 110 kv. as the most desirable transmission voltage for this line was determined both by an economic study of costs of transmitting this energy such a distance with various voltages, and by a full consideration of the economics of interconnected operation with other utilities in the vicinity. These companies now operate or contemplate the conversion of principal trunk lines to nominal 110-kv. operation and, as physical interconnections have existed for many years, the economic advantages and the necessity for planning for future interchange capacity already have been demonstrated. The transmission line itself is of H-frame wood-pole construction and terminates on the bank of the Columbia River about one mile west of Vancouver, Wash. At this point, Hayden Island divides the Columbia River into two channels, the north channel being 3,460 ft. wide and the south channel 1,360 ft. wide. Therefore, two separate crossings were required. (See Fig. 1).

Cost comparisons between an overhead and a submarine river crossing at this point clearly established the economy of the submarine method when considering a capacity to correspond with the construction program necessary to meet the load and service requirements. Factors contributing to this decision were the excessive minimum clearance (198 ft.) above low water requirements; the flat terrain in the vicinity of the crossing site; the small increment cost for a double-circuit overhead crossing over a single circuit, making construction for two circuits the logical procedure although only one was needed initially; and the unusual mechanical strength requirements for the overhead construction due to the occasional extremely severe ice-loading conditions encountered.

Considerable time was devoted to a study of the relative merits of cable with a solid type of insulation as compared with the oil-filled type. Important facts which led to a final decision to specify oil-filled cable were:

(1) Favorable operation records of oil-filled cable over the past four years, particularly when compared with solid-type cable operating at high voltages;

(2) High electrical endurance strength of oil-filled cable as demonstrated in laboratory in field test;

(3) Ability of the latter type of cable to maintain perfect impregnation and prevent void formation and ionization;

(4) Development of satisfactory joints for oil-filled type of submarine cable.

Thorough analysis was made of the practice of trenching cables in the river bottom as a protection from external damage. With the present river depth of minus 28 ft. (low water at 0), excavation of the river bed to a depth of minus 40 ft. would be necessary to be beneath the future ship channel as well as out of reach of anchors and dredge cutting heads. It was estimated that $40,000 to $50,000 would be expended in preparing a trench of the requisite dimensions and suitable to withstand the river current. Furthermore, it was doubtful if a trench at right angles to the flow could be kept open during the laying without additional expenditures for sheet piling or for removing extra sand yardage.

With cables buried in such a manner, it is believed that it would not be economically practical to salvage them in case a defect developed which would necessitate abandonment and the loss of a relatively large investment. If laid directly in the river bed, it is believed that an oil-filled cable can be lifted and repaired readily in case a fault develops or the cable suffers damage. Experience records of the Northwestern Electric Co., covering eleven 3-phase, 11-kv. submarine cables laid in the general vicinity of the new site, disclose only one cable failure, that being due to the cable being picked up by a dredge bucket.

This favorable experience record, combined with greater accessibility and smaller chance of abandonment, together with fixed charge saving of from $5,200 to $6,500 per year, were responsible for the decision to lay the cable directly in the bed of the river.

Following the determination of the type of cable and the method of installation, it was decided that a hollow-core, single-conductor cable of the following specifications would be most satisfactory for each circuit:

Inside diameter of copper supporting spiral, 0.690 in.
Inside diameter of conductor strands, 0.790 in.
Outside diameter of conductor strands, 1.277 in.
Conductor cross section, 750,000 circ. mil.
Thickness of wood pulp insulation, 0.560 in. (nominal).

*From a paper presented at the Baltimore Section meeting of the A.I.E.E., Oct. 10-13, 1932.

[1]Northwestern Electric Co.
[2]General Electric Co.
[3]Electric Bond and Share Co.

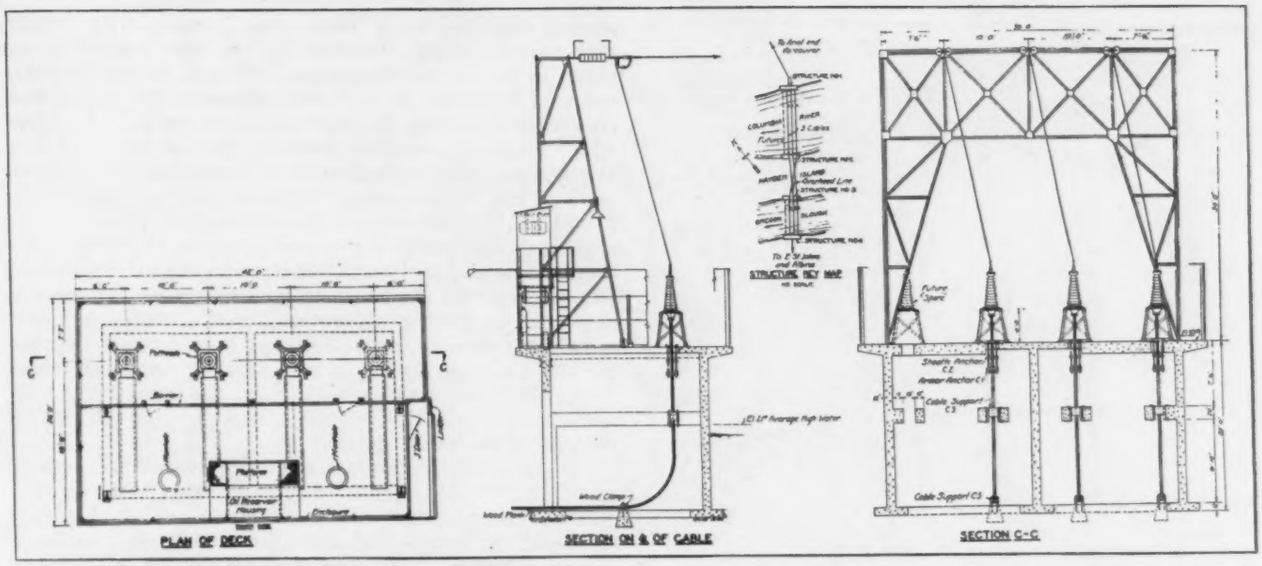


Fig. 1—Details of the terminal structures showing location of the cables and housing for the oil pressure system. Relative locations of the four structures and the two submarine crossings are shown in the key map

Perforated copper shielding tape (0.005 in.) interlocked with one paper tape.
Inside diameter of lead sheath, 2.497 in.
Outside diameter of lead sheath, 2.810 in.
Lead sheath 5/32 in. 2 per cent tin-lead alloy.
Two layers 16/3-ply tarred jute and asphalt.
Hard-drawn copper wire armor (0.238 in. diameter).
One layer 16/3-ply tarred jute, asphalt and whiting.
Overall diameter, 3.80 in.
Weight, 20 lb. per ft.
Voltage rating: 115 kv., three phase, grounded neutral.

In rating such a cable, it must be remembered that the carrying capacity of a submarine cable, where the same size conductor is used throughout, is determined by the thermal conditions at the shore ends, the temperature rise of immersed section being much smaller. For this particular installation, the carrying capacity was more difficult to determine than usual because of the relatively short vertical risers at the ends representing the limiting thermal conditions. Due to transfer of heat from these exposed vertical risers into the earth, the usual formulas for cable in air do not apply exactly and the thermal correction factor was checked by heat run after installation. On the basis of an ambient air temperature of 40.5 deg. C., this cable has a conservative rating of 575 amp. for a maximum conductor temperature of 70 deg. C. in the vertical risers with the copper armor bonded at the base of the terminals. If steel armor had been used under the same conditions, the rating would have been only 430 amp., due to excessive armor and sheath losses. The advantages of low resistance copper armor in this respect are fully described in a previous publication.*

In the impregnation of this type of cable, operations are performed solely for the purpose of initially removing air, moisture and other impurities from the entire system and completely filling it with oil, thereafter always maintaining a positive oil pressure during storage, shipment, installation and operation so that impurities cannot enter through accidental leaks. This cable was manufactured in seven sections, one 3,717 ft. length for each of the three conductors crossing the north channel, one 1,532-ft. length for each conductor crossing the south channel, and one 832-ft. length for a spare; each length was mounted on a separate reel. Oil pressure reservoirs were mounted in the body of each reel to maintain the oil pressure in that length of cable from 5 to 15 lb. during shipment and installation.

Reels were mounted axially in a permanent cradle and equipped with brake bands for unreeling the cable at the proper speed. Due to their excessive size and weight, a special gondola car was required for transporting each reel.

In addition to the cable, the following accessories and special installation and maintenance equipment were furnished:

14 single conductor outdoor porcelain terminals or potheads.
6 6-gal. Type CC (gravity cell type) oil feeding reservoirs.
8 10-gal. Type CC reservoirs.
4 10-gal. Type AC (cell type) oil pressure reservoirs for maintaining pressure on emergency oil supply tanks at each terminal.
8 50-gal. emergency oil supply tanks with oil level gages, nitrogen gas cylinders, valves, fittings, etc., connected two in parallel at each terminal.
800 gal. special oil in 50-gal. drums for filling terminal equipment after assembly.
4 valve panels (six valves each) for emergency paralleling or interchange of oil feed for each phase.
2 repair joints with Everdur armor box and clamping rings.
Copper tubing, armored lead piping, valves and miscellaneous fittings for connecting oil system.
1 portable, motor-driven oil degasifier.
1 portable, motor-driven vacuum pump.
1 impregnating bottle.
Rubber vacuum hose, toggle clamps, tanks of specially dried carbon dioxide and miscellaneous fittings.

Following the usual practice of using one size larger porcelain, the outdoor potheads are rated at 132 kv. These potheads, which have a guaranteed dry and wet 60-cycle flashover of 375 kv. and 280 kv., respectively, were subjected to rigid tests for leakage before shipment. Terminal lugs have a flexible type stud to allow limited movement of the cable conductor during expansion and contraction, and there also is a special shut-off valve in the stud so that oil pressure can be maintained in the cable core while vacuum treating and filling the terminal with degasified oil after assembly.

Terminal structures, four in number, consist of reinforced concrete bases and platforms supporting cable terminals and accessories, as well as the steel dead-end structures for the overhead lines. Although the lower portions will be submerged at high water, the decks of these four structures are all at the same elevation above the usual high water level and each is surrounded by a barrier of steel plate to protect the potheads from bullets of youthful sportsmen who frequent the neighborhood. Facing the water is a large sign warning against anchorage. Conductors of the overhead transmission line are dead-ended at the steel structure through shearpins designed to fail at the

* "Losses in Armor Single-conductor, Lead-covered A.C. Cable," by Schurig, Kuehni and Buller, "Transactions, A.I.E.E.," 1929, p. 417.

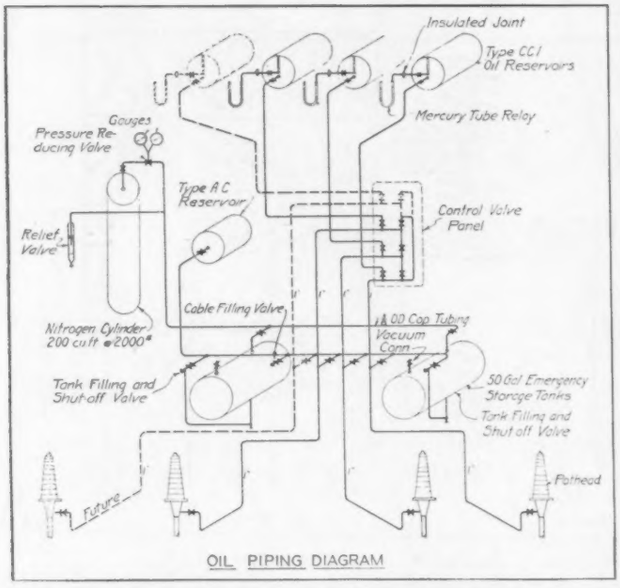


Fig. 2—Oil pressure system as installed on each terminal structure. In case of an oil leak, considerable time must elapse before the cable can be raised and repaired; the emergency oil supply system insures that a continuous oil supply will be maintained during that period. It consists of two 50-gal., drum-type reservoirs installed at each structure, with suitable piping and manually-operated valves to connect the reservoirs to the cable system when needed. Adequate pressure is supplied from a tank of nitrogen through a reducing valve. Safety valves are provided to limit the oil pressure in the cable when operating under emergency conditions. For short periods of time, the contact of the nitrogen and oil is not especially objectionable, although for longer periods of time it definitely would be deleterious. Oil pressure for normal operation is maintained by the gravity reservoirs, mounted 44 ft. above mean low water, shown at the top of the drawing

value corresponding to the maximum safe strain on the structure, the structures themselves being self-supporting and designed to withstand maximum expected strain under heavy ice loading conditions on the 795,000-circ.mil, A.C.S.R., overhead conductors.

Two concrete dead-men are provided at each terminal structure for anchoring the cables. Chains carried back from these dead-men to the three cables are attached by means of basket grips, this attachment being considered sufficient due to the fact that a considerable section of the cable (that between the structures and the water's edge) is buried in the sandy river bank, which will take up a considerable amount of pulling tension.

As the cable armor is hard-drawn copper, some special problems were encountered in the bonding and grounding of this installation. During operation, the armor carries a current almost as great as that in the conductor and, for this reason, carefully designed and installed high-capacity bonds are necessary. Careful study of probable electrolysis conditions, including analysis of the river water, indicated that there should be very little corrosion due to electrolysis. If electrolysis tends to start at any point, the lead sheath soon becomes coated with a tough, permanent film of lead sulphate, thus automatically stopping the action. However, since with copper armor any corrosion which might occur would affect the anodic lead sheath and not the armor, it was considered advisable to take all possible precautions against damage by corrosion. To this end, the armor strands of the three cables are bonded together at each end separately from the sheaths, the latter also being bonded together separately and grounded. The two sets of bonds are connected together by a removable jumper, both armor and sheath being grounded when this jumper is in place. The idea of this arrangement is to permit periodically inserting an ammeter between the armor and sheath and testing for electrolysis currents. If appreciable currents should develop, the sheath and the armor then can be separated by removing the jumper, or they can be connected through a battery supplying a potential to counteract the electrolysis potential.

Ground electrodes consist of a series of driven rods inter-connected with each other and with all equipment and structures, forming a low-resistance grounding network. Lightning protection for the cables and terminals consists of simple spillway gaps mounted across the dead-end insulator strings at each terminal structure. They are well grounded to the grounding network, which in turn provides a short and effective connection to the cable sheath.

The necessity for maintaining positive oil pressure in an oil-filled cable already has been explained. In submarine installations, the water pressure at different points on the profile also must be considered. The limiting condition is the maintenance of positive oil pressure at the middle of the cable length during the coldest weather without exceeding the safe oil pressure on the sheath at low water level under full load summer conditions. Although the armor gives some support to the sheath, the practice is never to exceed a pressure of 20 lb. per sq. in. at the low water level.

Contributing to the difficulty of this river crossing is a 33-ft. differential between low-and high-water levels. After a careful study of conditions, it was decided to

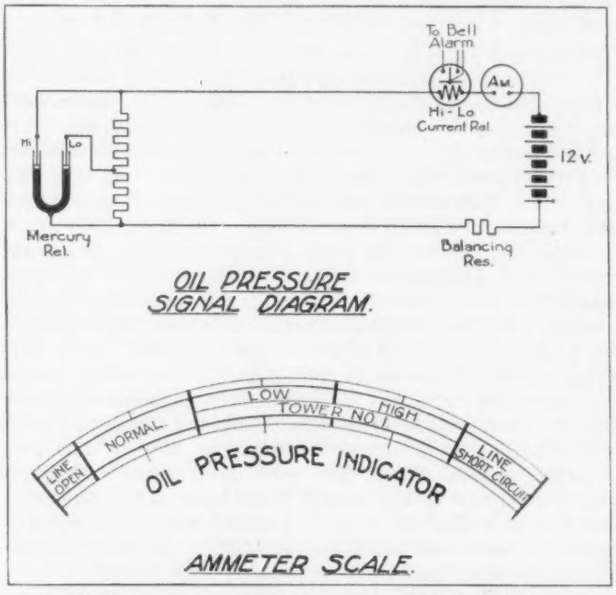


Fig. 3—Oil pressure alarm system by which conditions in the reservoir are transmitted to the nearest attended substation, at Vancouver, Wash. Mercury tube relays (shown on the reservoirs in Fig. 2) are combined as shown, with varying resistances to permit individual indication from different reservoirs at a given location to be transmitted over a single telephone line, the indication being recorded on an ammeter-type indicator. Three of the terminal structures are so equipped

use gravity feed reservoirs mounted at the same level (44 ft. above low water) at both ends of each cable and feeding toward the middle. This represents an oil pressure of 18 lb. per sq. in. on the sheath at low water, and leaves only a 1 or 2 lb. margin of oil pressure over water pressure at the extremes of winter operation. This margin was considered sufficient because of the transient nature of such conditions, the

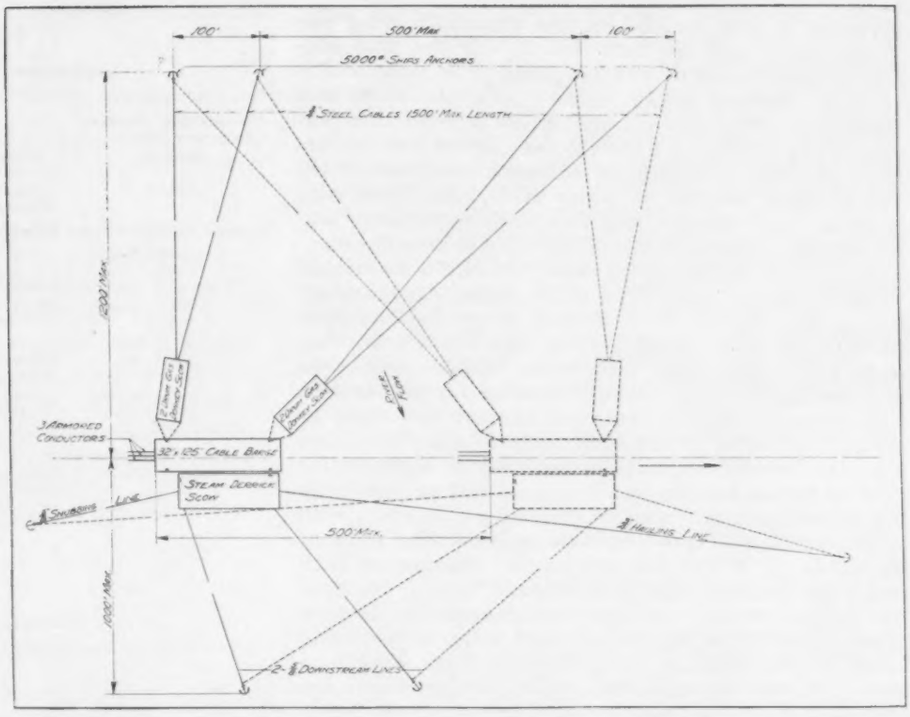


Fig. 4 — Diagram showing the method of lining-in the cable during the laying operations. Donkey scows on the stern and bow of the main barge are held to a definite course by the four upstream anchor lines. The derrick barge is provided with anchor lines fore and aft. Anchor lines are adjusted to maintain essentially a straight course over a given distance, two positions for the same anchor locations being shown in the diagram

pressure drop in the cables lasting for less than an hour after load is dropped.

These limiting conditions and the need of utilizing all available oil pressure did not allow the use of restrictors for limiting oil flow in case of accident in hot weather. In the winter such restriction is not needed, but in the summer the reservoirs would empty at a fairly rapid rate in case of a "full open" accidental leak on the system. This question was given careful study, but space does not allow inclusion of all details. Briefly summarized, the conclusions are:

(1) The regular switch signal or the oil level alarm relays will give warning immediately or soon after the accident, allowing an emergency crew to be on the scene within one or two hours;

(2) The position of the failure and other factors will determine whether the reservoirs involved are exhausted of oil by that time. If not, the emergency oil supply is turned on and the nitrogen gas pressure adjusted (20 lb. limit) to maintain an oil flow not greater than 6 gal. per hr. This will entirely prevent entrance of water or air in the system and the flow can be maintained until the damage is located and repaired;

(3) Even if one or more reservoirs are found exhausted, the water will enter the cable core very slowly, if at all, and will have traveled only a short distance by time crew arrives. Emergency oil flow will then be adjusted as described, the oil leak located and the cable picked up, not at point of leakage, but 200 ft. on each side. It will be cut under oil flow at these points and tested for moisture, repeating the operation in 100 ft. steps if necessary. A length of replacement cable will then be spliced in.

Repair joints, held in stock for such emergency use, have been used successfully in previous conduit installations and are of standard design, with the exception that the spun copper casing is protected by cylindrical Everdur armor box, having bolted armor clamps at each end. Cable paper is stepped and the usual low-loss varnished cambric tape used for reinforcement wrappings. The halved connector is of the double shut-off plug design that has proved successful in the past.

New and unusual problems were presented to the construction forces during the installation of this cable. Careful engineering was required because of the im-

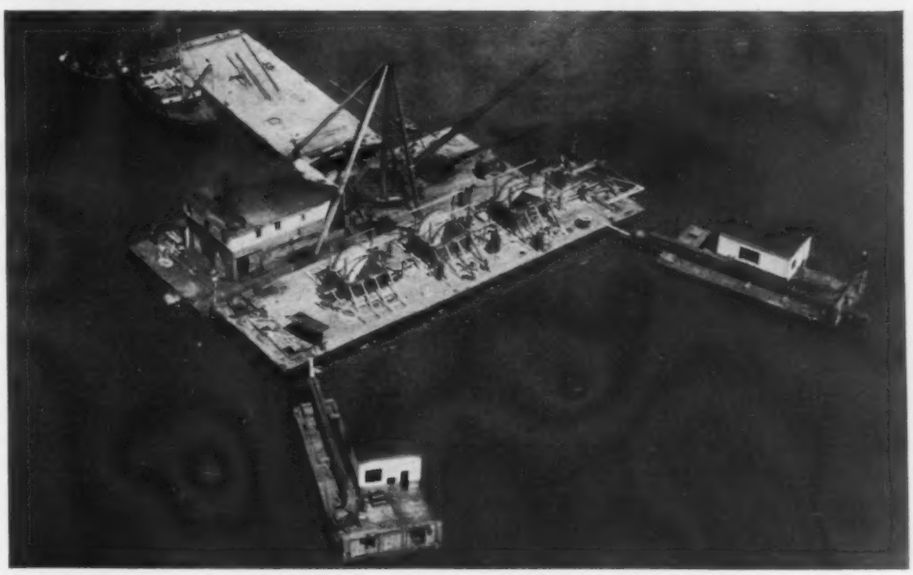


Fig. 5 — Airplane view of the laying operations showing the arrangement of the barges and other equipment

portance of this installation, the unusually great size of the reels, and the fact that it was the first submarine installation of oil-filled cable to be made in this country. Several weeks before the installation was started, a school was set up for the construction personnel and intensive training was carried out, including such work as making up pothead connections by the use of short lengths of scrap cable, etc. That such training was valuable was indicated by the fact that no serious mishaps occurred during the installation.

Equipment for laying the cable included a flat-decked barge of 400-ton capacity, a steam dipper dredge barge which was utilized as a derrick, two small gasoline donkey scows, two small derrick tugs and a spare flat-deck barge for extra deck space. Cable reels were mounted on the main barge in tandem for proper deck load distribution, the two reels nearest the stern, or laying end, being raised sufficiently to allow the cable from the forward reel to pass underneath. Rollers were used to reduce friction to a minimum and an overhanging timber structure was constructed at the stern with rollers arranged for a minimum safe bending radii of the cable as it was fed overboard. Flanges of each reel were equipped with friction band brakes, one used for laying control and one for emergency. Donkey scows were placed at the bow and stern of the cable barge on the upstream side. Guiding these were four steel lines, two to each scow, which were anchored upstream, the anchors being moved in successive steps across the river. The derrick barge was held alongside the main barge on the downstream side with bow and stern anchor lines to control its movement across the river. One small tug was used for changing anchor lines and anchors, the other held for emergency use.

Buzzer and bell signals were provided to each operation control point. One point was where the cable went overboard, by which slack and reel movement were controlled; another point controlled barge movement across the river and the upstream anchor lines to the donkey scows. At another point on shore, men with transits were located for alignment of the cable across the river and were in communication with the barge operators by telephone.

The technique followed in laying both sections of the cable was essentially the same. All three cables for each crossing were laid at the same time. In brief, shore ends of the cables were pulled into the terminal structures and clamped into their final positions with sufficient slack for installation of the terminals.

Temporary oil connections then were made between the three cable ends and the permanent oil supply system which previously had been installed in the terminal structures. At this same time, a reserve supply of oil was made ready and the temporary oil reservoirs on the cable reels closed off so that the oil pressure was maintained from the shore system during laying operations.

After placing the necessary slack outside the terminal structure, the crossing was started, operations being guided from the shore stations with the barge position maintained as described in Fig. 4.

Upon approaching the opposite terminal structure, slack, as engineered for that location, was dropped off at a predetermined point. This slack was laid out on the deck of the spare barge and lashed into place with cross timbers, which later were raised by the derrick while the spare barge was withdrawn. The suspended cables then were carefully lowered into the river and the lashing cut, allowing the timbers to float to the surface. After this operation, the equipment was moved to the terminal and shore end footage pulled off the reels and laid on the deck of the spare barge. Reels were removed from the main barge and each cable carefully lowered into its final position after shore-ends had been clamped into place in the terminal structure.

TABLE I

Calculated and Heat Run Data

Load in amperes (100%)		840	795
Circulating Current (Avg. per cent)			
Sheath	Measured	12.1	...
	Calculated	11.3	...
Armor	Measured	90.3	...
	Calculated	93.2	...
Armor Temperatures (Max.)			
Columbia River			
In air	Measured	28.0	...
	Calculated	30.1	...
Under water	Measured	...	24.1
	Estimated	...	24.6
Oregon Slough			
In air	Measured	...	30.5
	Calculated	...	29.7
Under water	Measured	25.4	...
	Estimated	26.7	...

Oil Level in Reservoirs		**At 795-amp. load**	**At no load**
Columbia River	Measured gal.	8.0	4.5
	Calculated gal.	7.88	4.2
Oregon Slough	Measured gal.	4.8	2.8
	Calculated gal.	4.53	3.1

	Columbia River	**Oregon Slough**
Water ambient*	15.0°	16.0°
Air ambient*	17.0°	18.0°

*These ambients correspond to maximum armor temperatures.

Laying in the main channel was more difficult than laying in the smaller channel because of the high water and heavy current. During this operation the oil connection between the inner end of one cable and the reel reservoir sheared off when about 1,000 ft. from the starting point, due to creepage of the inner layers. The man handling the emergency oil apparatus at the terminal structure noted the drop in pressure and, according to instructions, turned on the emergency oil supply, thus maintaining the required pressure. Before the crossing was completed, similar accidents had occurred on the two remaining cables. As the leaks could not be repaired until sufficient cable had been unreeled to expose the break on the inner layer, it was problematical, for a time, as to whether a sufficient supply of degasified oil would be available to maintain oil pressure on the cable until the leakage could be stopped. The fact that pressure was maintained until that time demonstrated the wisdom of connecting the supply to the permanent system during the operations.

Immediately after laying the cables, the slack at each shore end was disposed of and installation of the terminals was begun. While terminals were being installed at one structure, the oil pressure on the cable was maintained through the temporary oil connections at the opposite structure. After completing the permanent installation at the first terminal, the operation was reversed so that it then supplied the pressure during the installation work on the other shore. During all the operations, telephone communication was maintained between all four terminal structures.

Upon completion of the installation, a complete 3-phase, 60-cycle, short circuit heat run was made, the results of which are shown in Table 1. This run served the dual purpose of causing uniform dispersion and absorption of any small amount of impurities which might not have been excluded, and furnished a final check on the calculations.

Functioning satisfactorily under normal operating conditions since June 19, this pioneer installation of high voltage oil-filled submarine cable may be considered to have opened a new chapter of transmission practice.

Transformer Obsolescence

What Factors Determine Obsolescence and How Are These Factors Computed in Deciding Whether a Transformer Should Be Repaired or Scrapped? In This, Article No. 5 of the Series on Utility Economics, Are Presented Answers from Two Viewpoints—That of an Operating Engineer and That of a Manufacturer

An Operating Engineer Analyses Transformer Life

By J. C. HENKLE,
Portland General Electric Co.

OBSOLESCENCE and depreciation of electrical equipment have been the subject of much discussion and of many papers and books during the past few years. Yet, the rapid development of new ideas makes this a subject of continued interest to the entire industry.

As applied to electric light and power properties, obsolescence may be defined as that form of functional depreciation resulting from new inventions or radical improvements in the art, in the light of which present methods or machinery become inefficient.

Obsolescence of equipment or of the entire parts of the physical system may be due to many reasons, among which are: age, inadequacy due to growth of the system, and the necessity for improvements in economy and reliability.

The extremely rapid progress and development in invention and design during the years since this industry came into being progressively has caused the obsolescence of practically all of the original, and many of the succeeding, types of equipment used. During this time we have seen many of the once important and even essential, parts of a system become obsolete and, finally, discarded. The system layouts of the early properties provided facilities that soon were outgrown and, although they were expanded and reinforced, their ultimate replacement became inevitable. Even with the accumulated experience and the advanced knowledge of the present day applied to system layout, it is reasonable to expect that many of the systems now being designed will prove unsuitable to meet conditions that may arise in the future.

Because the subject of obsolescence of electrical equipment is so broad, only transformers will be considered in this discussion. The evolution of the transformer has been traced many times and is available to all who may desire to refresh their memories on the various types encountered in the process.

Probably the most important improvement in the design and manufacture of transformers was the introduction of silicon steel, about the year 1906. When this new steel was employed in the manufacture of transformers, the core loss dropped very rapidly and there was a corresponding increase in efficiency. Since 1908 there has been a gradual improvement in the quality of steel used in transformers, and that, combined with reduction in copper loss due to improvements in coil design, has resulted in the production of transformers with losses, roughly, about 50 per cent of what they were 20 years ago. This leads to a consideration of the economies of the replacement of old, inefficient transformers with high-efficiency transformers of new, modern design.

Many authorities have developed formulas for use in determining when it is economical to replace old transformers with new ones; all of these formulas are based upon capitalizing the savings in losses. These various authors use substantially the same methods in arriving at the results of their computations, although the factors used differ somewhat in each application.

Factors to be considered in determining the obsolescence of distribution transformers are:

1. Core loss in watts of old transformer under consideration. This value is easily obtained from the manufacturer's data on earlier designs or by direct measurement, if the transformer is not burned out.
2. Core loss in watts of the new transformer.
3. Cost of repairing the old transformer. (This varies with the locality and cost of materials).
4. Cost of a new transformer.
5. Trade-in value or junk value of old transformer.
6. Value of annual overhead charges in per cent. (This was found to be 12½ per cent, locally.)
7. Cost of energy (in cents per kw.-hr.) at the primary side of the distribution transformer. The cost in the Northwest was found to be 1c. per kw.-hr. The factors that enter into the cost of energy are the production cost of energy per kw.-hr., which includes such items as fuel, lubricants, water, labor, etc.; and the fixed charges* per kw.-hr., which include such items as interest, taxes, insurance, depreciation, office expenses, labor.
8. Copper loss. This factor usually can be eliminated because the copper loss has been fairly constant for a great number of years, especially in the smaller sizes of transformers.
9. Cost of energy loss due to poor regulation. This factor, too, may be eliminated in most systems where the feeder regulators are adjusted to regulate on the distribution secondaries.

In order to better understand the method, let us take, as an example, a burned-out 10-kva. transformer built about 1907:

Core loss = 127 watts average for that period.

Trade-in value = $15.

Cost of new transformer = $90.

Core loss of new transformer = 57 watts.

Annual overhead charge on investment = 12.5 per cent.

Cost of energy at distribution transformer = $0.01

A. Annual overhead cost of the new transformer = (cost of new transformer minus trade-in value of old transformer) × (per cent value of annual overhead charge) ÷ 100 = ($90—$15) × (12.5) ÷100 = $9.37.

B. Operating cost of new transformer per year = (core loss watts) × (cost of energy) × (8,760 hours per year) ÷ 1,000 = (57) × ($0.01) × (8,760) ÷ 1,000 = $5.

C. Total annual cost of operating transformer = A + B = $14.37.

D. Operating cost of old transformer = (core loss watts of old transformer) × (cost of energy) × (8,760) ÷ 1,000 = (127) × ($0.01) × (8,760) ÷ 1,000 = $11.12.

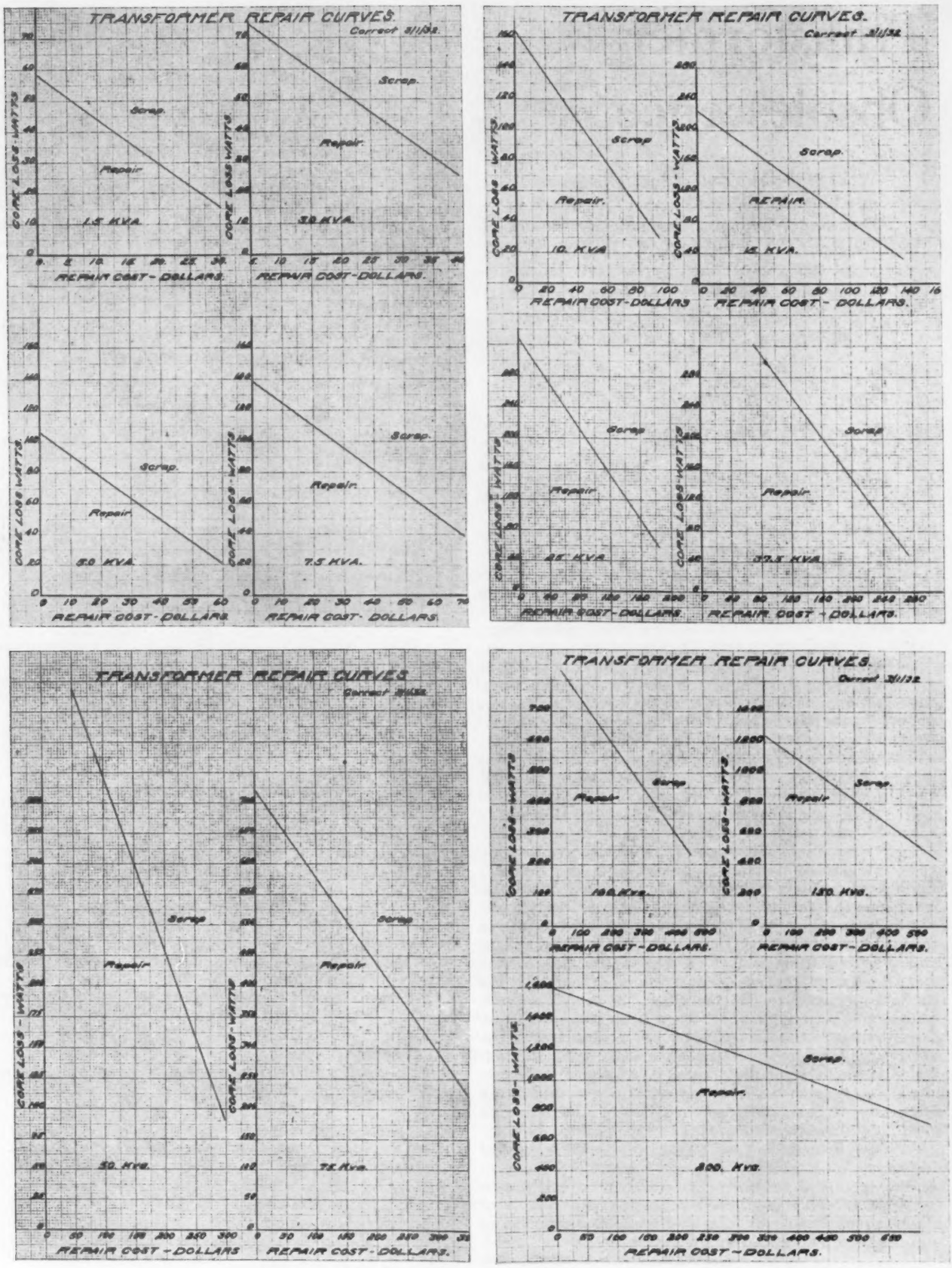
E. Annual overhead cost allowable on old transformer = C — D = $14.37 — $11.12 = $3 25.

F. Capital investment allowable for old transformer repairs, assuming a 20-year life for the rewound transformer = (annual overhead cost allowable on the old transformer × (100) ÷ (value of annual overhead charge in per cent) = ($3.25) × (100) ÷ 12.5 = $26.

Since it costs $45 to repair this transformer and we are allowed to spend only $26, this transformer should be traded in or scrapped.

Costs used in this example may not be applicable

*The fixed charges should be divided in the proper proportion between the principal uses of the energy, namely, railway, large power, street lighting and distribution.



Transformer repair curves for various distribution ratings. Knowing the core loss and repair costs of a given transformer, the most economical procedure can be determined readily: if the common point falls beyond the dividing line, the transformer should be scrapped, otherwise repairs are justified. Determination of the "repair" and "scrap" areas involves comparing the capitalized operating and repair costs of the old transformer with those of a modern design of the same rating, the procedure being outlined in the accompanying text

to all cases, for they are variable quantities and may differ materially in different localities.

By referring to the accompanying transformer repair curves, it can be seen that, with a core loss of 125 watts and repair cost of $45, this transformer falls well into the area where it is recommended to scrap it. In many cases where the capitalized savings about equal the cost of replacement, it may not be considered necessary or expedient to retire the old transformer and replace it with a new one, but should it be necessary to make any major repair, then no doubt it would be more economical in the long run to junk the old transformer and substitute a new one.

Methods described herein for distribution transformers may be applied also to power transformers, except that a slightly different value for the cost of energy at the transformer must be used.

Obsolescence Viewed By a Manufacturer

IN CONSIDERING the disposal of a transformer which is in need of repair, three alternatives are presented: first, the purchase of a new transformer to replace the old; second, making repairs on the old transformer locally; and, third, replacing with factory parts core and coils in the case of a 2,300-volt unit, or replacing coils only, in the 6,900-volt class.

When analyzing the costs of these three methods, it is fair to credit the new transformer with the amount of oil used, because new oil is not included in the cost of repairs. With that in mind, costs for the three alternatives are calculated as follows:

In the case of a new transformer, the cost of oil in quantity and the exchange allowance are deducted from the transformer's local price, giving the net cost to the utility.

Local repair costs are penalized with the higher losses characteristic of older transformers, because these losses are perpetuated in the repair.

In the case of the 6,900-volt unit, where factory-built coils are installed locally, the cost of repairs is penalized for the same reason given in the preceding paragraph. Where it is possible to furnish factory-built core and coils, as with transformers of 2,300-volt rating and below, repair costs are not penalized, as a modern design will be furnished.

In the following comparison of costs, transformers of the 2,300-volt class are considered to have been built between 1911 and 1922, and those of the 6,900-volt class to have been built between 1918 and 1922. Average losses for each group are compared with the 1932 losses for the same rating. Copper losses have been disregarded, as very little change has occurred in this factor during the last 25 years.

Furthermore, core losses have been assumed to have been supplied 8,760 hr. per year at a cost estimated to be 0.6c. per kw.-hr. The difference in core loss between old and new design has been capitalized at 6 per cent in order to express the difference in core loss in terms of capital expense.

In the accompanying table, losses and costs for the three alternatives have been expressed as a percentage of the cost of a new transformer of each kva. rating in the distribution voltage classes.

It is interesting to note that the largest advantage is realized on the transformers of the higher ratings. This is because the differential in losses on the large size is much greater than on the smaller sizes, as the table shows. The analysis shows that, generally speaking, there is a saving of approximately 10 per cent in the repair of old distribution transformers, as against the purchase of a new replacement on the exchange basis. If factory-made parts are used, the saving is somewhat greater. If losses are considered, it actually is cheaper to repair the transformer with factory-made parts than with locally-built parts.

Percentage Costs of Transformer Replacement

Transformer rating in kva.	2,300-v. rating: Local repairs, per cent of new transformer	2,300-v. rating: Factory parts, per cent of new transformer	2,300-v. rating: Local repairs vs. factory parts	2,300-v. rating: Losses in per cent of new transformer	6,900-v. rating: Local repairs, per cent of new transformer	6,900-v. rating: Factory parts, per cent of new transformer	6,900-v. rating: Local repairs vs. factory parts	6,900-v. rating: Losses in per cent of new transformer
5	96	83	116	8	84	77	109	6
7½	93	83	111	12	83	77	108	12
10	92	85	108	14	97	82	118	16
15	89	81	110	20	84	78	108	22
25	91	83	113	28	87	77	113	31
37½	96	85	110	45	88	76	116	30
50	95	86	...	47	86	78	111	40
75	103	...	...	97	115	108	107	165
100	115	...	...	138	148	143	104	320

In this discussion, no consideration has been given the comparison on the basis of quality, of factory-built transformers, locally-repaired transformers and transformers rebuilt with factory-made parts. An attempt to express this in mathematical or tabular form generally results in the expression becoming too involved and too hypothetical. Consideration must be given, however, to the fact that equipment for giving coils the vacuum and compound or varnish treatment generally is not available for local repairs, and this is considered very important by most operating engineers. With the coils dipped and baked, there is no assurance that the repair will be free from the difficulties resulting from a concentration of moisture at the center of the coil, which may be caused by the compound pushing the moisture ahead of it as it enters the coil and leaving a bubble of air or moisture in the center.

Another possibility in the rebuilding of coils is that of redesigning them to reduce the losses. The quality of the steel cannot be changed nor can the copper conductivity be increased. Therefore, reducing the flux density of the core by adding turns to the primary or secondary can be done by increasing the space factor, which in turn can be done only by sacrificing the space for insulation or oil ducts. Generally speaking, it is impossible to change the characteristics while rebuilding the transformer unless it is done at the expense of other factors such as insulation or temperature rise.

Although this analysis shows certain advantages in the use of factory-built core, coils or both for the repair of transformers, a disadvantage is the time element necessary to secure these parts. Because of the wide variety of designs, no manufacturer can stock such parts in every city for each local utility, and obtaining them from the factory entails considerable delay in repairing the unit.

This discussion considers those transformers which are in need of repairs and does not consider the replacement of transformers still in an operative condition, but which may have excessive losses. Under present conditions, the policy of operating companies is to shorten the time in which savings must amortize the cost of the replacement to a point which practically prohibits transformer replacement justified only by savings in losses. Furthermore, the wisdom of that policy is questioned by many authorities and probably no widely accepted solution can be made until more comprehensive cost records and more rigorous methods of engineering analysis are available.

Fig. 1—General view of the Sacramento Municipal Airport. The control point for all main electrical circuits is housed in the glass enclosed "pulpit" on top of the small building in the center of the photograph

Careful Planning Buys Adequacy at Low Cost

By W. J. DELEHANTY
General Electric Co., San Francisco

By Adapting Standard Commercial Equipment to Airport Requirements, Specifications for Sacramento's New Air Terminal Made a Modern Installation Possible at Minimum Expense

CONFRONTED by the urgent need for adequate airport facilities and having but limited funds to apply for such a purpose, the City of Sacramento, Calif., submitted its problem to a competent engineering authority for solution. Today that city has an airport equipped not only with every modern device for the safety and comfort of air travelers, but also with facilities which will permit future expansions to be made at minimum cost.

In accomplishing this with the funds available, a thorough analysis of the present requirements and probable future traffic was necessary to insure electrical adequacy with the original installation. With this as a basis, a layout of the system was made. The present airport is located approximately two miles south of the main business district and consists of a combined hangar and office building for each of the two air lines serving the city, a general administration building for the airport operation, a third hangar for general use, and the usual facilities, such as lights, beacons, etc.

Inasmuch as the ground layout of the airport limited savings in copper and conduit used in the service, it was apparent that such economies as might be possible would have to be obtained by careful selection and arrangement of other electrical equipment. It is possible that the methods employed in this installation might be of interest to others who may contemplate plant additions or expansions under current financial conditions.

Overhead wires being prohibited in such installations, the complete service is underground, the power supply terminating at the main highway and being brought underground to the substation located in the main hangar, near the road. The main underground system is enclosed in a fiber duct system encased in concrete, the wire being of the 3-conductor, lead-covered type with a weather-proof neutral. For boundary, street, and approach lights, conductors are parkway cable buried directly in the ground. Wiring in the buildings is of approved conduit construction.

Power at 4 kv. is supplied to the 3-panel main switchboard through a double-throw circuit breaker, one side of which will be utilized for a second feed in the future. Figs. 2 and 3 illustrate the handling of primary power and it will be noted that the supporting structure and the bus are extended to facilitate installation of future panels, conduits for which already are in place. One feeder from the main board is carried un-

derground at 4 kv. to the other hangar; the second feeder supplies the step-down transformer bank located in the same room. This bank supplies the 208/120-volt, 3-phase, 4-wire circuits for one hangar and the administration building. Secondary power is distributed through the dead-front steel switchboard shown in Fig. 4.

One feeder circuit from the main bus is taken off through disconnecting switches, no oil breaker being installed, terminates in the metal-encased bus structure mounted on the wall, and feeds the various series lighting circuits through the equipment shown in Fig. 5. Each of these latter circuits, supplied at 2.3 kv., is equipped with a D&W cutout, a Novalux controller for series lighting circuits and a type RO series lighting transformer. Two of these supply the hazard lights and the field floodlights, respectively; a third is to be used for the street lights surrounding the airport. Street lights are not yet installed, but the complete equipment now is available. To supply them with power, all that is necessary is to install and connect the standards. The fourth of these series circuits supplies the border lights of the landing field. As the total number of lights in this circuit is too great to be connected on one transformer, primaries of two series transformers are paralleled in the small metal-enclosed bus, shown at the extreme left of Fig. 5, and are controlled from one Novalux controller. Each of the transformers is connected into one-half of the boundary light circuit, the mid-point of the opposite side being grounded.

In fundamentals, the installation as thus far described seems to employ conventional methods and equipment. However, a study of Fig. 5 discloses that the installation not only is flexible and economical in construction details, but also uses standard equipment. This practice is carried out throughout the distribution system.

Although there are five manholes in the concrete duct system, these are not used as places to install equipment, but merely to aid in pulling circuits or tracing trouble. Circuits, instead, are brought through the manholes intact to what might be termed distribution rooms above the ground level in the particular buildings to be served. Buildings so equipped are the two hangars, the tower and the administrative offices. In the distribution rooms are a switchboard and transformers (if necessary) through which local lighting and small power circuits are served.

The principal advantage of this design is the elimination of the more expensive subway-type equipment and the substitution therefor of standard apparatus, as there is no possibility of submersion. As the substation also conformed to this practice, the saving on

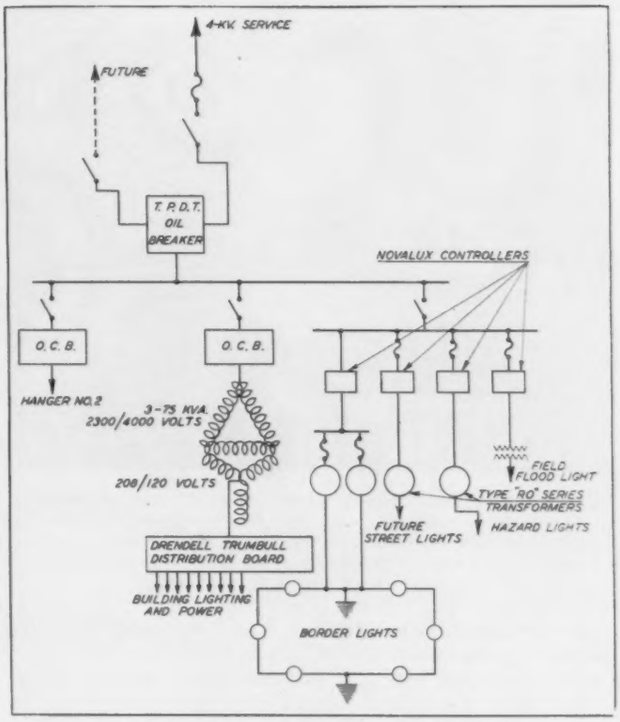
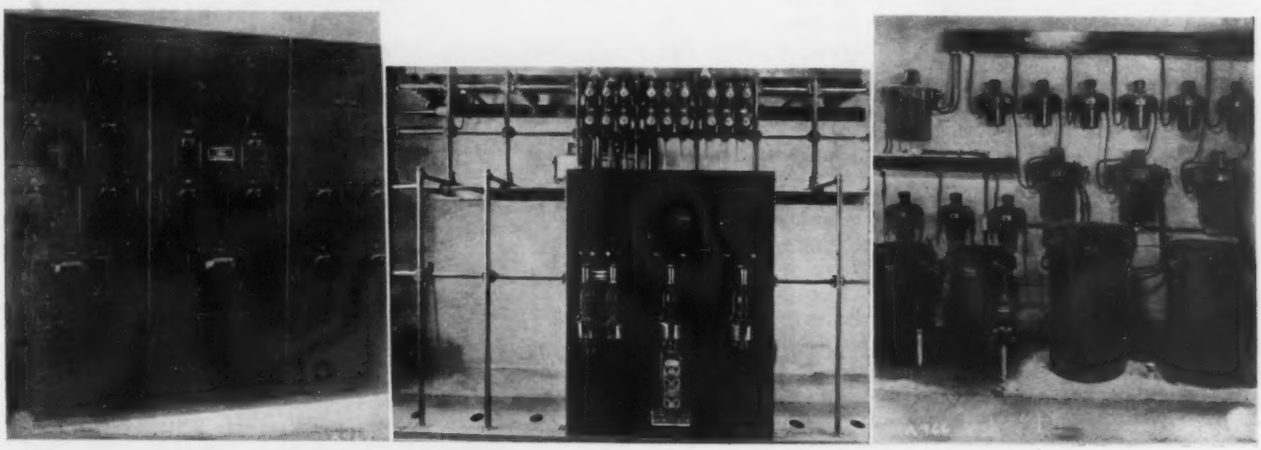


Fig. 2—One-line diagram of the electrical distribution circuits

that equipment alone was a major economy of the installation.

For safety and economy, it was considered desirable to place all airport operations under the control of one man, in so far as possible. The control point selected is in the "bridge" or "pulpit" of the administration building, a vantage point overlooking the entire field. To simplify operations there, an idea was borrowed from the central station engineer, in that controls are mounted on a bench-type switchboard. Important circuits are controlled through small snap switches equipped with indicating lights. This control board is shown in Fig. 6 and it will be noted that the functions

Fig. 3 (center)—Main switchboard with extended bus and supporting structure to facilitate future additions. Conduits for future panels already are installed. Fig. 4 (left)—Dead-front distribution panel from which 3-phase, 4-wire lighting and power circuits are taken. Fig. 5 (right)—Equipment for controlling the series lighting circuits at the airport. The flexibility and economy of this arrangement are obvious, savings also being effected by mounting all electrical apparatus above the ground, thereby eliminating the need for the more expensive subway-type apparatus



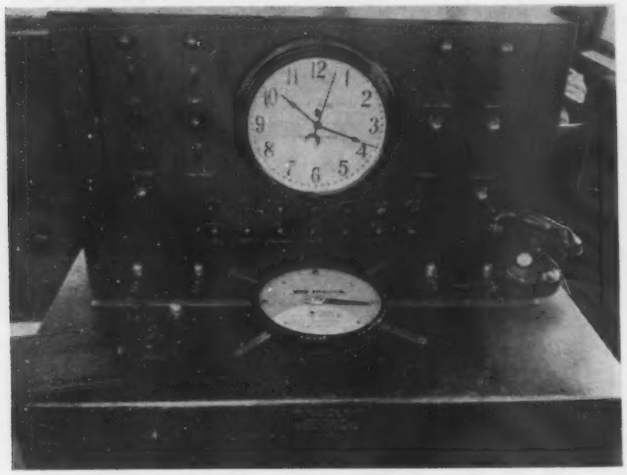


Fig. 6—Bench-type control board from which main electrical circuits are controlled. Features of this board are the Selsyn wind-direction indicator and the use of metal strips to visualize the layout, only here they represent airport runways rather than electrical circuits

under supervision are the main and auxiliary beacons, border and approach lights, street lights, hazard lights, four main power circuits, taxi lane flood lights, ceiling lights, twin field flood lights, and the warning siren control. Furthermore, the board is equipped with a Selsyn wind-direction indicator mounted on the horizontal section with metal strips around its periphery to symbolize the runways on the field. Connected to the wind-cone, mounted at some distance from the building, is a Selsyn transmitter which follows movements of the cone and electrically transmits these movements to the Selsyn receiver. Directly connected to the armature of the receiver is the indicating hand of the switchboard dial, so that the airport operator knows the wind direction at all times.

Communication facilities also are controlled from this point, so that the operator can signal incoming and outgoing planes to take the runway dictated by the wind direction. Inasmuch as all circuits are equipped with indicating lights, the operator knows immediately when warning or hazard light circuits are inoperative and is able to check such operations as he may make from the control position.

Remote control for airport circuits is highly desirable, but, under usual methods, is more than ordinarily expensive because of the generous spacing allowed bebetween buildings and the area of the field itself. In the interest of economy, control of the Sacramento airport circuits was given careful study and a system of auxiliary relays installed. Instead of bringing main control wires to the operator's desk, a pair of No. 20 wires was run from each magnetic contactor to the desk. Control switches operate only a small auxiliary contactor at the location of the main switch, contacts of the former energizing the coil and thereby operating the main switch.

Throughout, this installation is an excellent example of what can be accomplished with limited funds. The preceding description will testify that the equipment is ample for present requirements and modern in every detail. By a generous use of copper in main circuits, by including from two to four spare ducts in the underground system, by providing spare circuits on the main and control switchboards and by installing power equipment for the street lighting circuits with the initial development, future expansions can be made readily and inexpensively.

Contributing in no small measure to the success of the development were the carefully prepared specifications. These were written after consideration had been given to all phases of the problem and were the result of an extensive study of methods by which the investment could be minimized without impairing the quality or serviceability of the installation. So comprehensive were the specifications in exact detail that they served both as a basis for making up bids and for instructions during the installation. Engineering of the job was under the supervision of Geo. W. Duncan, Jr., consulting engineer, Sacramento.

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Fiber Underfloor Duct Aids Building Planning

By R. C. Mixer

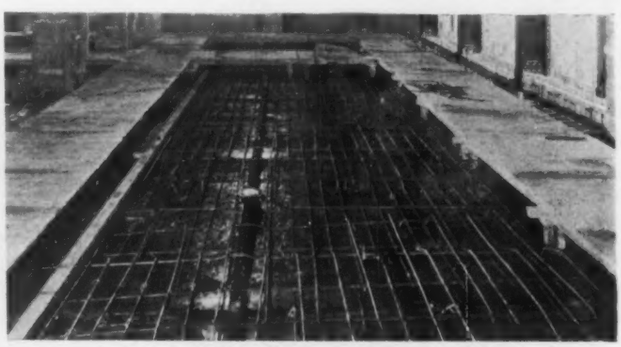
PRESENT-DAY officing problems have necessitated careful planning of large buildings so that any type of business may use any bit of available space. The increasing use of electrically-driven business equipment and the need for adequate telephone and signal facilities have resulted in the development and use of raceways known as underfloor ducts.

Constant change of tenants and the periodical moving of desks in most offices require that this duct be flexible in the extreme. Architectural requirements, such as those imposed by limit-height buildings, and requiring that the floor slabs be of minimum thickness, have resulted in the monolithic or single-pour.

To take care of all these items, it became imperative that an underfloor duct which could have universal application must have certain very definite characteristics; thus, Fiberduct, a wide, shallow, flat-bottom, oval-top, non-corrodible duct, was designed.

In composition, Fiberduct is similar to fiber underground conduit, millions of feet of which have been used by public utilities in all parts of the country during the past quarter of a century. In service, as well as in laboratory test, it successfully has resisted every known type of corrosion.

Fiberduct is 1½ in. high, 3¾ in. wide, with walls 3/16 in. thick; its height is less than that of 1¼ in.



Duct in place strapped to reinforcing rods and adjusted to height from the pan, prior to the concrete pour

conduit, while its area approximates that of 2½ in. conduit (3 sq. in.). These dimensions make it shallow enough to permit its use in thin floors. Its oval-topped construction assures maximum floor strength, and its non-corrodible composition assures an unobstructed wiring channel for the life of the building. Fiberduct is furnished in convenient 5-ft. lengths which are joined by a combination coupling and support, adjustable to any desired height. Junction boxes are provided to give accessibility to the raceway and they are adjusted to the proper level by leveling screws. The covers are large enough to facilitate fishing and are recessed to receive a section of the floor covering, whether it be concrete, linoleum or wood, thus making them inconspicuous.

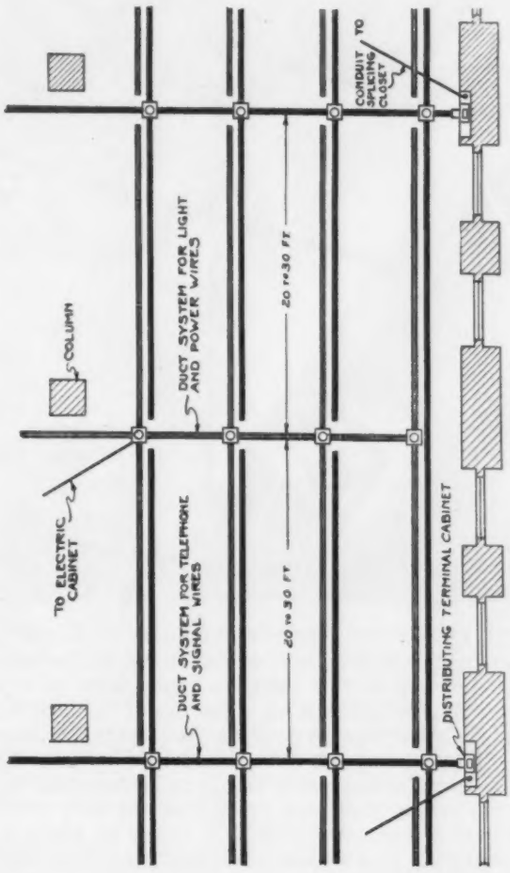
The prime function of any underfloor duct system is to permit the installation of outlets when they are needed and precisely where they are needed. Fibreduct possesses this feature; it is 100 per cent flexible. The duct is available with factory-set "Prelokaylets" on 2 ft., 2½ ft. or 3 ft. centers, or they may be snapped on the duct at any desired point immediately prior to the pouring of the concrete. "After-set" inserts may be installed where desired, at any time during the life of the building, by chipping a small hole down to the duct. A substantial brass insert is threaded into the duct and firmly grouted into place; the insert thus becomes an integral part of the floor and cannot pull out. Surface fittings are either flanged or flush. Abandoning plugs are provided when it is desired to abandon an outlet.

Fiberduct outlets are of two types: the metal housed head of Gothic design and an insulated head with no metal to touch when plugging in.

Underfloor duct systems may comprise a single run for either light or signal systems, or a run of parallel ducts for both lights and telephones. For parallel systems, junction boxes are provided with partition walls so arranged as to definitely separate the different types of circuits, providing accessibility and crossover features. The feeds are brought to the junction at a 45-deg. angle on the corners or through a special box closure plate, if this opening is not used by the duct.

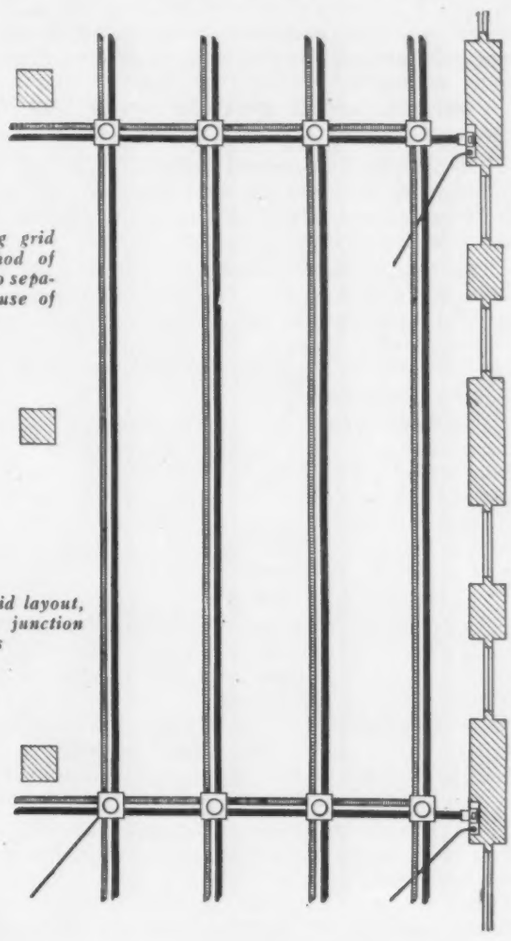
If the Fiberduct is run to the wall, an adjustable elbow can be used to bring the duct direct to the panel-

Editor's Note—In September, 1931, an article descriptive of metal underfloor duct systems in office building construction was published in ELECTRICAL WEST. Manufacturers of fiber underfloor duct took exception to its predominantly metallic preference and then were asked to prepare an article upon fiber duct so as to present their own case. This article is the result of such negotiation, and was written by a former wiring material specialist for General Electric Co. While no particular reference is made to any western installation of fiber duct, the Mills Tower, a recent addition to the Mills Building, in San Francisco, made use of this material. The installation there was made by the H. S. Tittle Co., San Francisco electrical contractors.


TO CONDUIT SYSTEM CLOSET
DUCT SYSTEM FOR LIGHT AND POWER WIRES
20 TO 30 FT
COLUMN
TO ELECTRIC CABINET
DUCT SYSTEM FOR TELEPHONE AND SIGNAL WIRES
20 TO 30 FT
DISTRIBUTING TERMINAL CABINET

Left — An interlocking grid layout showing method of paralleling ducts of two separate systems without use of double boxes

Right—A double grid layout, using double duct junction floor boxes



Mills Tower, 22-story addition to the Mills Building, San Francisco, made use of a fiber underfloor duct system for telephone service

board can. Duct end markers are provided, as are duct markers, so that the duct may be spotted even if partitions intervene.

Fiberduct layouts generally are of the following types:

The Single Run-around Layout, in which the duct follows the walls, is the simplest. The major demand for service generally is located here, whether it be for power or telephone.

The Double Run-around Layout possesses the same advantages as the single run-around, except that it has parallel ducts and double compartment boxes. This layout provides a raceway of wiring to electrically-operated office machines and a separate raceway for telephone or signal wiring.

The Single Grid Layout gives complete floor coverage for either power or lighting or telephone and signal distribution. The first line of duct generally is laid approximately 3 ft. from the outside wall, as in the case of the run-around systems; complete floor coverage then is obtained by placing other duct lines parallel to it at intervals of approximately 5 ft.

The Double Grid Layout is a 100 per cent system. It gives complete floor coverage and provides for power and lighting as well as telephone and signal distribution. The junction boxes are placed 20 to 40 ft. apart, depending upon the estimated density of wiring. The power and lighting circuits generally are fed by conduit from the electric panelboards directly to the junction boxes, while the telephone and signal circuits usually are fed by ducts from wall cabinets.

The Interlocking Comb Layout provides the same floor covering as the double grid layout, but maintains absolute segregation of high and low potential circuits. It consists essentially of the double duct system with single compartment junction boxes. It does not require the use of crossovers or baffle plates and, due to the absence of the latter, the single boxes are ½-in. more shallow, permitting the use of this system in thinner floors. This is a patented layout exclusive to fiber duct.

The Triple Grid Layout is being specified more and more frequently by engineers. As the name suggests, this layout resembles the double grid except that triple duct boxes are utilized. This makes it possible to take care of buzzer and other types of low voltage circuits without interfering in any way with the telephone circuits.

Originally confined almost exclusively to the monumental type of structure in metropolitan districts, the use of underfloor duct has spread rapidly during the past few years, until today it is being specified for one- and two-story buildings in small cities and towns. Furthermore, its use is no longer restricted to the office type of building, and we find it being included in all sorts of buildings in which it may be necessary to establish additional electrical outlets after completion.

Because of the inherent adaptability of fiber as a raceway material for a system designed for permanence and accessibility, the use of Fiberduct has increased by leaps and bounds during the past few years and, with electrical engineers becoming more and more "duct-minded" and tenants becoming more and more "duct-demanding," it seems certain that its use will continue to increase from year to year.

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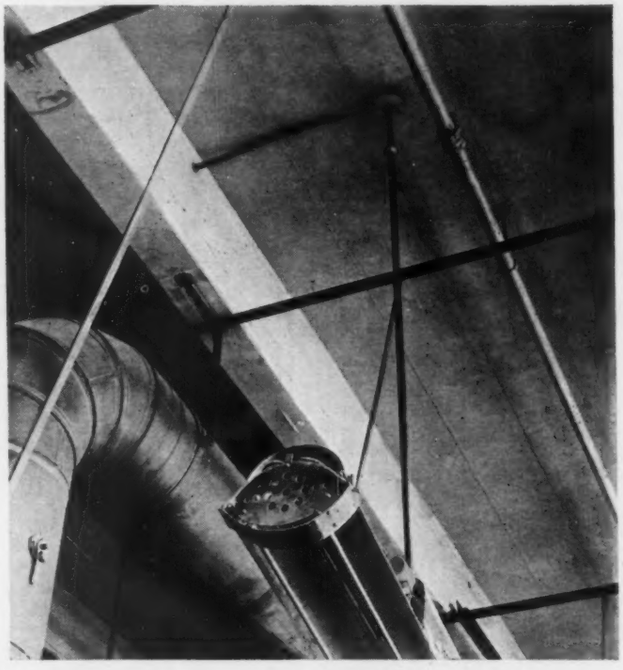
Using a Swivel-Joint Bushing As a Fixture Aid



WHERE fixtures are suspended by means of a length of conduit dropping from an outlet box at the ceiling, as in the case of this mercury vapor lamp at the Los Angeles Can Co. plant, a little feature of installation detail is provided in the equipping of the conduit with a swivel joint bushing 6 or 8 in. below the outlet box. Thus if the cover of the outlet box is to be loosened for access to the wiring itself, the cover does not slide down the full length of the conduit and can easily be replaced after alterations. In an industrial plant this little fea-

ture is enough to keep the outlet box cover from being forgotten and never replaced, as so often happens. The swivel joint also provides for perpendicular hanging of the fixture regardless of the outlet box, which, due to irregularity of the slab, might be slightly off true. Another advatage of running the conduit and box exposed on the ceiling rather than in the slab is that greater flexibility is provided.

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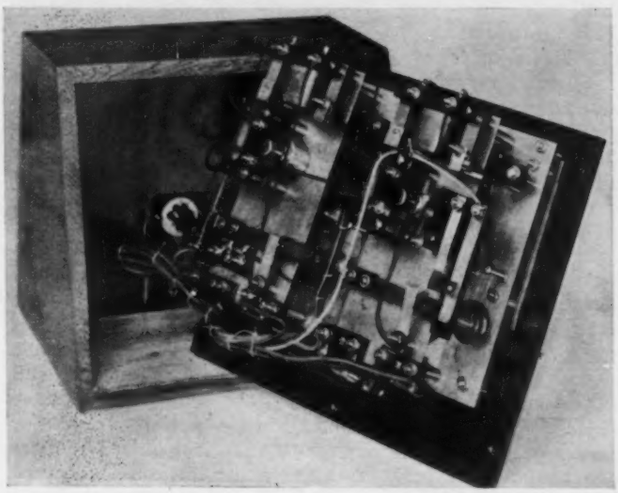
Electricity Goes On the Gridiron

AS FOOTBALL becomes more and more complicated, from a spectator's standpoint, it becomes increasingly necessary that something about the game be simplified. J. F. Thomas and Edward Schleuter, of F. A. Thomas Co., San Francisco, have accomplished that with an electrically-operated time-keeping mechanism.



Above—Interior of timekeeper's control box

Stanford and California universities already have used the system for football and basketball games, and other schools, especially on the Pacific Coast, are contemplating an installation.

Two parts compose the system: a control box for the time-keeper and an electric clock mechanism at the scoreboard. The electric clock is a Telechron, for which the Thomas company is a distributor, and a ⅛-hp. motor is used for driving the machinery.

As may be seen from the illustrations, the timekeeper's control box has two dials, one for recording the minutes and seconds of play, another for keeping time during "time-out" periods. Operation of the system is simplicity itself. At the opening whistle, the timekeeper presses a button, starting the first dial; when "time-out" is called, he presses another button, stopping the first dial and starting the second. When the "time-out" period is ended, he presses the first button again, stopping the second and starting the first dial. Thus, an accurate record is kept on the one dial of the actual minutes of play, while the other, in no way affecting the first, allows the official to see that too much time is not taken out.

At the score board, the clock is synchronized with the control box and, while it does not record the time out, the hand stops the moment the game is interrupted and starts when play is resumed. In this way the fans, as well as the officials, always can tell to a second just how much time is left for the losing team to start a "Frank Merriwell" finish.

Stanford's scoreboard with its electrically-operated clock. Inset at the left shows the control box with its two dials and switches for each. Inset at the right shows the motor and mechanism, synchronized with control box, that operates the clock on the scoreboard

And Now— The Dealer

Has the Contractor, Motor Specialist or Dealer Measured Up to His Responsibilities in the Distribution of the Industry's Products?

As outlined to the editors

By FRANK E. BOYD

Vice-President and General Manager, Pacific Electric Motor Co., Oakland, Calif.

IN THIS series of articles, there now remains the consideration of the electrical contractor, the industrial or motor contracting firm, and the dealer. This, no doubt, will prove more pleasant reading to the other branches of the industry, especially to many who found it rather painful to learn from preceding articles what their customers and friends thought of their policies and activities.

It has been amusing and interesting to observe the diversity of reactions to this series of articles. Men in all branches of the industry have been complimentary about the completeness of these studies and have respected the sincerity and the constructive motives which have inspired them, whether certain phases of the situation struck at their particular interests or not. The normal traits of human nature, however, have been apparent, and there has been evidence of a lack of thorough inquiry into the underlying weaknesses of distribution which have made necessary a painful frankness in uncovering them. Surely, this is no time for self-satisfaction and complacency. Neither will apathy nor pique correct the causes which underlie the breakdown of distribution.

There has been no intention to "speak out of turn," to criticize without constructive intent; in reading these discussions, it would be well consider them as a group, to get from them the complete story, and not be diverted by the overemphasis of any one detail in any single article. For, in discussing the contractor and dealer, it is my intention that the same frankness and critical analysis will be used as with the consideration of the other links of the distribution chain.

If there are a few who take delight in learning of the failings of the other branches in the industry, but are profoundly concerned about any intimation that their own house is not altogether modern in its arrangement, they may take whatever comfort may be had in the admissions about to be made in this article concerning the contractor and dealer in the distribution picture. For in starting this series, it definitely was stated: "In each branch of the electrical industry we have made mistakes. Contractors have made many, and I'm afraid that often the other branches of the industry still measure the contractor in terms of those mistakes."

Now about the contractor, the dealer. How has he contributed to his own present status, and what must he do to redeem the position which he should occupy in the distribution picture? Has the contractor measured up to his responsibility? Has he been a credit to the industry? Has he been constructive? Has he been consistent?

It must be said of the contractor, especially the industrial contractor, that his organization most nearly measures up to the demands for service made by the consumer. (See EWEST, Jan. 1, 1932, p. 28.) He is equipped to give or get for the customer engineering advice, provide the proper control and installation facilities, guarantee performance and conformity with code and safety rules. He makes available emergency service, carries repair parts, can service the equipment in case of any trouble, handles and reconditions second-hand equipment that can be used to the customer's advantage, has a stock of rental motors and equipment for emergencies, and can handle exchanges and rearrange existing equipment or modernize it and render it of more value to the customer. No other outlet for electric motors measures up to all of these requirements so well as does the motor specialist, the contractor motor dealer. The strategical advantages which the motor dealer of this kind possesses in the distribution picture can become the most valuable distribution asset that the industry can have, because, in addition to these mechanical services, he can bring to bear his acquaintance, his local prestige and civic influence, and his practical experience and field knowledge.

Responsibility?

Unfortunately, contractors generally have not capitalized all their possibilities. They have not met their responsibilities equally well in all directions. In the measure that they have failed to do so, they have given rise to general impressions that are not true of all contractors, but that many in the industry use as a convenient excuse for by-passing all of us in trying to reach the consumer before their own competitors reach him.

Have contractors measured up to their responsibilities? In some measure, yes. Probably they have done so equally as well as have the other branches of the industry; all have glaring deficiencies. But it is useless to hurl accusations at each other and then neglect to clean up the reasons which make the accusations possible. Let us frankly look into our own deficiencies as contractors and dealers.

Some of us have been careless, even loose, regarding the financial ends of our businesses. After all, that must be the skeleton, the framework of the entire business. We have not given it proper attention. We have not sought to create a strong financial structure, from which we would be able more readily to do the other things we are expected to do if we are to merit the place in distribution which we claim. If most of us had devoted as much time to the financial, the accounting and capital structure phases of our businesses as we have to the pursuit of business and to the technical phases of construction, we would have been better able

Editor's Note—Sixth of a series of studies on the Economics of Motor Distribution, other articles appearing in the Jan. 1, April 1, May 1, June 1 and Sept. 1 issues.

to give adequate and businesslike attention to the costs of doing business, to policies and finances.

The other branches of the industry have been shrewd enough to recognize that we have given our major attention to minor phases, and many of the unsound propositions submitted to us have been offered because of the weaknesses in our policies and in our business sense. It is true that many such propositions have not reflected any better business acumen on the part of our suppliers, but if we have not been business trained enough to appreciate this and refuse them, can they be blamed for continuing to submit such theoretical bubbles to us? We have a responsibility in turning down unsound plans, even if we expect the other branches of the industry to know better than to offer them to us. The surprise our suppliers register when we do turn down an unsound proposition indicates the fact that they are used to having their ideas accepted without question, sound or unsound.

If we ever expect to enjoy the respect and admiration of the industry, we must, as the owners of our businesses, give our major attention to financial and policy phases. It is a biblical axiom that "To him that hath shall be given."

If we devote our major interest to the financial part of our business, we will be able to better afford a presentable place of business. Having this we can gain a better reputation in the community, enjoying its good will. More people will want to trade with us. We will be able to acquire something in the way of establishment that no one can take from us.

Good financing means doing a profitable business. It will mean that we will give little or no attention whatever to lines or activities which do not carry adequate margins, that we will concentrate on those which do.

An influential position in the community necessitates activity in community affairs. It means representation in the trade associations that build constructively; it means reasonable participation in local clubs and movements; it demands sufficient time for recreation and contact with other business people, people of importance in the business life of our city. All of this takes money, and unless he concentrates upon the profitable phases of his business, no one of us ever can expect to become a factor in the community in which he operates. All we have to do is to look around the industry to see that those who have enjoyed such a position have done so in this far-seeing manner. Such men also are those who do the industry the most good. They are the important contacts by which the electrical industry may have its story told to the public.

Yet, in order to represent the industry properly, each contractor must have the head to think and the time to think. There are plenty of people who can be employed to do the actual work: the estimating, the buying, the running of jobs, the handling of repairs. If the contractor submerges himself in doing this work, he has no time to read the information he should get from business papers and books, to think out and plan management, to analyze business proposals and sales plans. He is not fair to himself and he reduces his value as a representative of the electrical industry. He will be unable to produce for the manufacturer, the jobber and the central station what is expected of him, because he keeps his nose too close to the grindstone. He cannot analyze markets, plan his selling, organize the information and make the contacts necessary to secure his business on a profitable basis; he cannot investigate credits and reliability of customers; in short, he cannot conduct his business as a business institution.

Has the contractor been constructive? In many ways, no. Some have spent too much of their time conniving and developing ways and means of trying to insure getting business at a profit by methods which border on restraint of trade. Of course this is not limited to the contracting branch of the industry, but this fact does not make such wasted efforts any more commendatory. All such efforts are a mere waste of time and always fail.

Many contractors have misspent their native ingenuity in devising short cuts and means of cheapening their jobs so that they might compete on a price rather than on a quality basis. One does not have to look very far to see that the contractors who have been successful despite the industry's handicaps are those who have spent their time and energies in developing noncompetitive business on a basis of merit and quality.

There seem to be two types of people operating businesses. One is the type that spends all of his time seeing how cheaply he can do things and how cheaply he can buy, not because of any sincere desire to save the customer expense, but solely to deprive a competitor of a job. As if getting a job in itself were any real accomplishment! Such thinking on the part of grown men has too long cast a doubt upon the intelligence of contractors and dealers, even though it is a type of thinking that is by no means restricted to our end of the industry.

The other type, the ultimately successful one, is motivated by a spirit of seeing how well he can do things. He eliminates buying problems by establishing certain buying policies, doing business with those in whom he, himself, has confidence. He does so with a feeling that he gets his supplies at reasonable prices, considering service and quality. He knows that in his own business the customer who comes in thinking only of buying cheaply gets no more than he pays for; the same must be true for himself in his own buying. If a man buys something cheaply, it is because he fails to get something that goes with its full price. It is a law of compensation, even as it is a law of conservation.

Consistent?

Has the contractor-dealer been consistent? If we, as motor dealers or contractors, expect adequate margins, we must be willing to pay adequate margins to our suppliers. Reciprocally, if the suppliers expect us to support them, they must see that it is worth while for us to buy from them. Contractors possibly have been as consistent in this as have the other branches of the industry, and in some instances have for a long time suffered distinct financial handicaps because of loyalty to a supply source that has not been as loyal to them in the final result of its distribution policies. No one in the industry can go around picking off bargains only. We must have consistent buying and selling policies and must insist on getting the same from the other branches of the industry.

One of the greatest strengths a contractor can have comes from his relationship with his local utility. But he cannot expect the utility to set up policies favoring his interests unless, in turn, he takes advantage of every opportunity to foster and protect the utility. In a like manner, the utility cannot expect this support and defense from the established contractors, the influential and well-respected business firms doing electrical work in their territory, if, when it has work to be done or favors to be granted, these are dispensed solely on a price basis among the unbusinesslike, unestablished electricians.

Many of our utility friends have the opinion that we are poor merchandisers. We are to blame for this impression and have missed an opportunity to show them that our lack of interest in exploiting many articles is

Bid Peddling

The following letter was received from a general contractor and published in the "Pacific Daily Builder." It expresses his views on the "bid peddling" racket. He places the responsibility squarely on the sub-contractors and calls upon them to put their own "house in order":

"It is with regret that I often read of how contractors peddle sub-bids. We hear from time to time of meetings called to correct this evil, putting all the blame on the general contractor. It seems to be taken for granted that the general contractor ought to be a saint that can withstand temptation.

"After a contract is let, original bidders and new bidders keep coming in for a 'chance,' almost all think that they can do better than their competitors, or else have a grudge against the low bidder in their line and are going to 'beat' him by offering a much better price and better work. About this time the general contractor has discovered a few of his mistakes and naturally such offers are very welcome, and much needed. When the sub-contractors forget and set aside their own pride and what they know are good tactics, it seems unfair to ask the general contractor to withstand temptation and expect him to point out to others the proper method for them to follow.

"I would say: Correct the evil among yourselves, put in your bid and let it stand, do not interfere after a bid is opened, and you can be sure the low bidder will always be called on to do his work."

attributable to the policies and the margins offered in respect to them by our suppliers. The utilities can be of great help to us if we solicit their support in urging the manufacturers and wholesalers to provide margins and policies that will stimulate our sales efforts. We must make the utilities our allies in a drive for better profits.

In general, there are several other weaknesses from which contractors suffer. Notably, contractors are weak in their support of their own trade associations. They expect a great deal from such associations, want them to cure all of the evils of the business overnight, but fail to see that they must pay the price in the form of dues and personal interest and participation. If contractors want their interests properly protected nationally or locally through their trade associations, they can get such protection only by paying for it. A cheaply-operated trade association, as with anything else cheap, gives just what service is paid for and no more.

I have heard contractors say that they would not waste time discussing trade problems with certain of their competitors because they felt that these men did not know what they were talking about. But such critics fail to see that many weaknesses of the industry result from their own unwillingness to contribute ideas and lend a hand in bringing about better business conditions. Personally, I have heard some of our poorest representatives of the contracting fraternity now and then voice some pertinent truth. I feel that any contact we can have with even the least representative of our industry will not be in vain. We can learn much from him, and he from us, and certainly our perspective of some problems will be broadened.

A great deal is said by electrical contractors about the evils of bid peddling. The statement recently made by a general contractor and printed in a box on this page aptly places on our own shoulders a great deal of the responsibility for this evil.

Our Job

Our job, as contractors and motor dealers, is like a three-phase triangle: on one side lies our responsibility to the consumer; on another is our responsibility to the manufacturer, the wholesaler, the central station, the industry; on the third side is our responsibility to ourselves, our need to build up profits and from that, capital. We can be successful only in proportion to the value of our service to all three. And, moreover, the load must be balanced.

We cannot serve ourselves adequately and loyally except by serving the others in a way to gain their admiration and respect. That is our job and our opportunity in the next few years. We have much yet to accomplish. If we are overly selfish, either as individuals or as an industry, we will defeat all of our efforts. And, likewise, we must not allow ourselves to be thrown off balance, to lose the sense of proportion so necessary, by following blindly the propaganda or unwise leadership of others.

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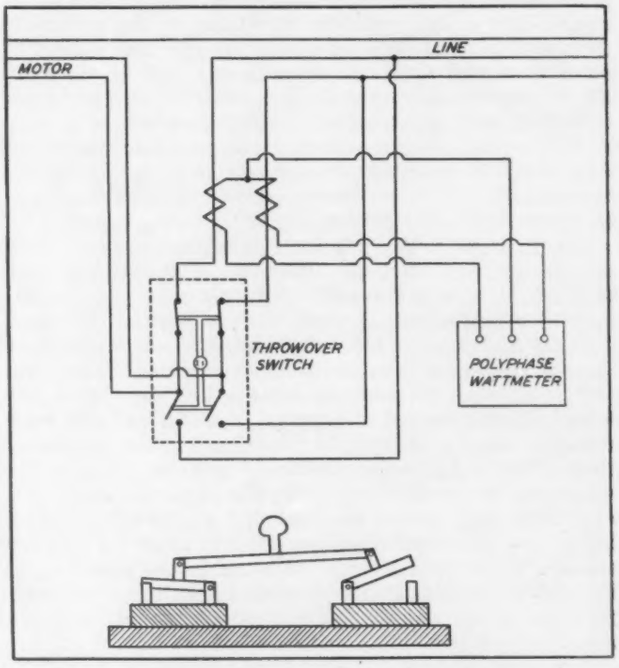
Automatic Control Features Irrigation Pumping System

IRRIGATION of the Santa Rosita ranch, in the Ventura coastal valley, near Oxnard, Calif., has been rendered as near automatic as possible. The ranch is the property of the Janss Investment Co. of Los Angeles and hence is operated by employees only. It was desirable that this one function of its operation be made as nearly foolproof and as nearly automatic as could be done, so that the entire attention of the personnel could be devoted to the farming of the property itself.

The electrical irrigation plant consists of a main pumping station and two booster stations, the former with a 60-hp. motor connected to a 90-ft. lift, deep-well pump and a booster pump with a 40-hp. motor. The second station has two 25-hp. motors and the third plant two 15-hp. motors, each of which are direct-connected to pumps, and in each instance either of the motors of the pair may operate singly or in tandem.

Operation of the booster plant motors is so arranged



Circuit arrangement for changeover switch wiring. At the bottom is a drawing of the simple changeover switch, designed by the contractor from knife switches, by which to shunt circuit through the meter without interrupting load

Two float switches control and protect the deep well and booster pumps. One pump feeds into the sump, the other out of it

that 25 sec. after the main plant starts up the booster pumps are cut in on the circuit, one at a time. Since a 50-lb. pressure is maintained on the booster line, the sequence of these operations is important.

At the main plant, the 60-hp. pump empties into a sump from which the 40-hp. pump picks up the water and boosts it to the next station. Two float switches protect the pumps at this point. They are mounted in the sump, one to operate the main pump when the water level drops to a low point, the other to operate the booster pump when the water has reached a necessary level in the sump.

The installation was made by J. L. Mitchell, electrical motor specialist of Oxnard, Calif., who engineered it, built its switchboard and devised an ingenious arrangement for indicating to the ranch attendants whether the motors are overloaded. It makes use of but one set of current transformers and one meter to test either of the two motors. By means of a double-throw switch made of two knife switches mounted together and interconnected mechanically, either motor may be switched to the metering circuit without interrupting the operation of the motors. The meter is calibrated in horsepower rather than in kilowatts in order to be more easily understood by the employee. If a motor seems to be heating unduly, any attendant can go to the switch board, throw in the testing switch and learn whether the motor is overloaded without shutting down first.

Switchboard containing automatic contactors, with main oil switch at lower right, and horsepower-calibrated meter for testing load by means of changeover switches

The plant is started by means of a float switch in a reservoir 3,800 ft. from the main plant. This necessitates a control circuit, run on poles, for this distance. It employs No. 14 bare wire and operates at 110 volts, actuating an I-C controller through a time delay relay. In case of power outage, this allows the main motor to come to a state of rest before restarting. The main switch is a Westinghouse oil circuit breaker with inverse time element overload relays. Pump motors all operate at 440 volts.

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Ingenuous Solution of a Mine Pumping Problem

OFTEN, in serious emergencies, the necessity arises to devise measures which would be out of the question under less extraordinary circumstances. An instance of this was recently experienced in underground mining operations when the water problem suddenly got out of control.

A centrifugal pump had been installed at the end of a 4,000-ft. drift, where a prospect shaft was being sunk. It was estimated in the beginning that the pumping unit and the temporary line were ample in size to handle any reasonable amount of water likely to be met, but as the shaft went down the water increased beyond expectation and the pumping unit was replaced with a larger one. Consequently, the line was overloaded at starting to the extent that the motor would barely start the load.

While plans were under way to install a heavier line, an unexpected water channel, which threatened to flood the entire workings, was struck. The problem was to get another pumping unit in operation without delay and to prevent the water level from rising further until the emergency could be met with a more permanent solution. However, when additional load was connected to the line the extra motor not only failed to start, but the voltage drop became so great that the other motor would stall. As there was neither time to parallel the line nor material at hand for the job, it was necessary to find means for adjusting the load in such a manner as to permit starting the motors without load and also to regulate the load if necessary after the motors were up to speed. This was accomplished by simply inserting makeshift valves on the discharge apertures of the pumps. In the absence of time for pipe fitting, the valves were simple contrivances consisting of separate planks braced against the end of each discharge pipe. When the valves were completely closed the pumps had no discharge and hence no output. Relieved of starting load, the motors came up to speed readily, while the pump rotors simply churned and discharged nothing. After speed was attained, the discharges were opened and the motors carried the load without stalling.

New Books

ELEMENTS OF ELECTRICAL DESIGN, by Alfred Still, professor of Electrical Engineering, Purdue University. Cloth bound; 6x9 in.; 583 pages; illustrated. Second edition. Published 1932 by the McGraw-Hill Book Co,. Inc., New York. Price $5.00. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This text familiarizes the student in electrical engineering with the fundamental laws by presenting problems met in the design of practical electrical apparatus. Material is presented so that the student will follow a logical sequence in designing from fundamental electrical laws and their application to practical electrical machinery. Economics pertaining to design problems are covered in discussions of various types of apparatus. Test problems included at the end of each chapter serve to bring out the principles covered therein.

Take an Interest In Your Customers

"If You Become Interested in Them, Your Customers Will Become Interested in You," Is the Motto of This Denver Dealer—and He Proves It

IF ELECTRIC appliances are hard to sell now, dealers and salesmen cannot afford to miss a single chance for adding to the prospect list and for building friendly relations with both customers and prospects. There are hundreds of ways of accomplishing these bits of good merchandising; almost every store has a few methods which are singular.

In Denver, the Household Appliance Co. uses all the usual practices and has developed a few which are unusual; that may be the reason the store has sold an average of 100 washers a month during the present year.

One of the most important phases of the customer-contact program has been the interest in children of customers and prospects. Whenever a salesman makes a call on a prospect or customer, he shows an interest in the child or children of the house. Not too much interest, of course, or the mother might become suspicious of the salesman's attention. But the salesman gets the names and birthdays and makes a note of this information. Then he sends out birthday cards on the specified dates.

"There is no surer way of gaining the permanent good will of a mother than to show an interest in her children," believes Andy Leerskov, manager of the washing machine department. "In most cases we get a 'thank you' call and many times a good prospect for the effort."

Mr. Leerskov also keeps a record of the date of every sale and, one year after the installation, the salesman sends out a card reminding the customer that "this is the first birthday of your washing machine," and inviting further trade or even sales tips.

Another activity important from the standpoint of customer good will is a home service. Mr. Leerskov, himself, goes to the home when a machine is installed and explains just how it should be run, where it should be placed to save steps, and gives similar hints. Then he makes an appointment to help the housewife with her first washing.

Moreover, monthly service calls are made, beginning 30 days after the sale and continuing during the entire life of the machine. This service consists of lubrication, inspection and necessary adjustments.

Mr. Leerskov does this work himself because he has found that customers like executive attention. Women feel that their trade is valued if the head of the department keeps in touch with them. Such service helps keep the customers satisfied, thereby assuring payments on time, and often yields good leads on the customers' neighbors.

When it came to getting prospects in a mass, the company solved that problem, too. An arrangement was made with seven leading neighborhood theaters in Denver and, for a period of three weeks, a washing machine was displayed in the lobby of each showhouse. Merchandise prize contests were conducted and advertising films were shown on the screens.

Thousands of people saw the washers during the display period and most of them left their names and addresses because each patron was allowed to enter a contest for the washer if cards were filled out. These leads later were followed up by telephone and personal contact. A member of the office staff phoned the contestants, offered a bridge pad as a consolation prize and inquired as to what appliances were being used and in what ones the prospect would be interested. Salesmen personally delivered the bridge books, giving the phone girl $1 if a sale was made. Mr. Leerskov estimates that this follow-up work brought about 10 per cent returns.

An interesting display of washers in the Household Appliance Co. store. Even the wallpaper seems to have life

Managers of the different departments of the store have different views on some merchandising subjects, but they all concur in their belief that territorial protection for salesmen pays even for non-utility appliance firms.

"We find that salesmen will make a larger number of contacts and will give more attention to the extended follow-up work, which often is required in getting the best deal out of a prospect, if they are fully protected," one of the department managers said. "Without protection, salesmen are inclined to restrict their efforts to a few prospects whom they try to sell 'right now' to be sure of getting their commission."

Although Household Appliance Co. has been in business only for about a year, the concern has built one of the best appliance trades in Denver. And it is reasonable to believe that it has been successful because it helps its customers help Household Appliance Co.

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Child Draws Crowds With His Crayons

SITTING on the sidewalk, a small boy drawing pictures with grease crayons of various colors on an electric refrigerator that had been placed in the entranceway for display purposes, brings passersby to a sudden stop before the branch of Hazelrigg, Foy and Gandee, Inc., Frigidaire distributors, at Long Beach, Calif.

"You'll catch it!" someone is sure to say, but the lad comes back, "Aw it won't hurt nothing. It'll wash right off."

Once in so often a troubled observer steps inside to inform a sales person of the boy's depredations, whereupon the salesman smiles and informs him that the finish on the refrigerator cannot be harmed by a child's artistic endeavors—that the pictures wash off readily, leaving no marred finish.

The boy is the 8-year old son of Eric Flamer, supervisor of sales. The father encourages him in his artistic attempts, for he realizes the power of good demonstration. Even within the display room one or two units may be found childishly decorated. They never fail to draw attention, and the salesmen's calm assurance that the finish is unharmed makes a convincing sales argument and a lasting favorable impression.

"Sure, the kid has sold refrigerators for us!" declared Mr. Flamer enthusiastically. "He's the best demonstrator we have!"

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Sales Contest Ends In an Outing

Bonuses to Salesmen Are Not New, But the Method of Payment Counts, Reasons Utah Power & Light Company, in Erecting Punchboards for Its Salesmen

"PUNCH yourself some dough," read the signs during a novel sales contest conducted among the salesmen of Utah Power & Light Co., Salt Lake. And the salesmen did just that!

During this contest, from July 18 to Aug. 19, all of the contestants in every division of the company's system were allowed $1 for each range, refrigerator and water heater sold. This money was used in accumulating a jack pot in each division. In the larger divisions, punch boards were prepared, and each morning in the sales meeting the salesmen received one punch for each sale made during the previous day. The punches were arranged on a percentage basis, accumulating from day to day, so that the entire amount of the jack pot could be divided promptly at the end of the contest.

As an added feature of the campaign, the Salt Lake division (largest division on the company's system) conducted its annual "ham and egg contest." The sales department was divided into two teams, known as the "hams" and "eggs," to which were added employees from some of the other departments, such as service and credit, who work in conjunction with the sales department, and also men from other companies directly interested in the power company's sales activities. During the 30-day period, a number of comedy sketches were staged at the morning meetings. A Saturday baseball game between teams and a golf tournament also added to the enthusiasm.

As the contest progressed, with sales running neck and neck between the teams, plans were started for a two-day outing to be held in one of the nearby canyons. Each person was assigned to one of the following committees: sports, entertainment, "dam foolery," show, camp equipment, camp fire and clean up, food, transportation, first aid, trap shooting, rodeo, finance and miscellaneous. It was understood definitely that the losing team would be flunkies, cooks, waiters and bottle washers.

On August 20, the two-day outing commenced, in which 60 men participated with a tremendous amount of enthusiasm. Various sports activities were included in the program.

The big event of the entire outing was the camp fire, around which the entire group assembled and enjoyed itself. Bonus checks covering the punch board drawings were presented during the evening; these checks were drawn on the "Ham and Egg National Bank," made payable to the nicknames of the men, and signed by the Salt Lake division manager. The checks were souvenirs of the outing, and the money was paid later at the company's offices. Another important event at the camp was the burying of "Old Man Depression."

The wholesome spirit of good fellowship evident during the entire contest is expected to be a material factor in stimulating sales activities.

Some are "hams" and some are "eggs," but all are salesmen. Though their bonus checks were made out to their nicknames and were drawn on a "phoney" bank, these Utah Power & Light Co. quota smashers punched some real money during the campaign

These Windows Really Sell

EVER the alert merchandiser, quick to sense trends and to take advantage of them, J. C. Hobrecht, Sacramento (Calif.) contractor-dealer has fitted his windows to the times. These are the days of small staples, of bread-and-butter items, Mr. Hobrecht found, and so instead of the constant hammering at the large appliances, he often fills his windows with "the things that sell nowadays," as he terms it.

In one of the two windows flanking the entranceway he has loaded many burnt-out radio tubes and an attractive display of new ones, with a suggestive sign advising testing and replacing of worn tubes. With this display are shown parts for short-wave receivers.

In the opposite window is a varied display. It begins with a repair department card, then shows a wide variety

of replacement parts, such as heater elements, cords, plugs, iron and appliance elements, fuses and the like. Next comes a group offering a variety of kitchen and bathroom lighting units, then a display of several types of electric irons, ranging from the ordinary low-priced article to the automatic models. Variety is the keynote throughout.

Last is a strong lamp display section showing every variety of lamp stocked, arranged and labeled in groups. These include a group of inside-frosted lamps, candelabra in various tints, a group of colored frosted lamps, a group of photographic dark-room lamps, sunlamps and health lamps, and a group of daylight lamps. The "lamp for every purpose" idea is well carried out.

These are the items which bring customers into the store. It keeps them coming for these necessities to the Hobrecht store and keeps up the habit Mr. Hobrecht has for years been establishing with them.

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An Attractive Store Is a Sales Aid

"PUT THE washing machine right out in the middle of the floor where folks have to stumble over it to get through to the other parts of the store and you will make them conscious of the washer," said Perry L. Watson, proprietor of the Gridley Electric Co., at Gridley, Calif. Mr. Watson's new store, finished late last year, embodies many such ideas in appliance merchandising practice. There are a number of attractive display tables, each with a select few articles upon them so that they may be displayed to advantage and examined by customers coming into the store.

On the left is the gable and in the background the radio and fixture room. The washing machine is right where Perry Watson placed it

At the rear of the store is a model stucco bungalow, which really is a radio reception room with a display of fixtures around it. Only a few fixtures are displayed, so each gets the advantage of more space and natural home atmosphere. The office and shop are adjacent to the fixture room.

Taking advantage of the Spanish architecture of his store, Mr. Watson has built a gable on an interior wall; in this are several niches. In the outside niche he places a light ornament. Back of the counters he has three niches; in one is kept a large assortment of lamps, in another is the cash register and in the third is the wrapping counter. A window with shutters, in which is placed a telephone, acts also as a means for anyone in the office to keep an eye on the store itself.

When the accompanying photograph was taken, Mr. Watson had just sold the last of a number of refrigerators he had in stock and had none left on hand. He does a sizeable business and always has been a very active and aggressive merchandiser.

Mr. Watson's window displays are something of a metropolitan delight for the small town in which he operates. At Christmas he particularly outshines himself. He makes moving displays, using pulley reduction gears and other tricks known to window dressers. Last year he built a crowd-attracting device in which Santa Claus was in an engine whose wheels moved, bringing a load of Christmas gifts to town.

Taking the Business Home

MAKING two blades of grass grow where one grew before is always good horticulture, but it is good electrical contractor-dealer practice these days as well. E. S. Abbott, proprietor of the Tracy Electric Co., Tracy, Calif., says he wishes he had started to do so six months sooner. In his case he built an attractive store and shop on the rear of his home lot. Having a corner location for the shop, he made a show window on the front facing Parker Ave. With this residential shop he is saving himself downtown rent. For the contracting part of his business he finds this handy in that his trucks and equipment are right at home.

Even the merchandise sales have proved as satisfactory as at his former location on the main street of town. Lamp sales, which are an index of store trade, have been just as good at home in this residential district as they were in town. The arrangement allows Mrs. Abbott to watch the store from her kitchen when Mr. Abbott is out on construction work.

An attractive feature of Mr. Abbott's place is the garden with a little fountain, lawn chairs, lawn, flowers and an ornamental pergola and fence. This he floodlights at night, making it both an enjoyable evening parlor out of doors and an excellent display of garden lighting from which he hopes to sell many more jobs.

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A Knockout Window

SOMETHING new in window displays was produced by Electric Home Appliance Shop, Denver, in the form of a prize fight ring. Principals were "Kid G.E.," the General Electric vacuum cleaner, and "Kid Dirty Broom." "Everyone Likes a Winner," reads a card near the G.E. corner; it also proclaims the vacuum cleaner victor by a knockout in the first round. Towels around the ring added to the effect. The loser, "Kid Dirty Broom," may be seen on the canvas in the center of the ring.

Letters to the Editor

Editor, ELECTRICAL WEST:

I took the liberty of having 500 copies of your "A Bigger Job Ahead for the Inspectors" editorial in the Sept. 1 issue of ELECTRICAL WEST (reprinted) for distribution at the Western Section meeting of the I.A.E.I. at Grand Rapids. . . .

Your editorial pages were sent to me, as they always are when I am away from the office, and your article made such a strong appeal that I felt it was worthy of distribution, and I am glad to report to you that I heard many favorable comments, and Mr. W. S. Boyd, secretary of the Western Section, made mention of it from the chair.

Mr. F. D. Weber was at the Grand Rapids meeting and will also attend the Eastern Section meeting at New York and the Southern Section meeting at Richmond and . . I will distribute copies of your editorial at both meetings.

Mr. Boykin, formerly with the Puget Sound Power & Light Co., at Seattle, now vice-president (of) Electric Bond and Share Co., New York, has always contended that the inspector was misnamed and that his title should be changed to that of surveyor.

H. B. KIRKLAND,
Uniform Legislation Dept.,
National Electrical Manufacturers Assn.

Editor, ELECTRICAL WEST:

It is an ill wind that blows no one some good. This so-called depression may, in the end, prove a blessing to the small electrical dealer—the major electrical appliance outlet. In the days of more and better business, this dealer was given little thought, but the manufacturer will admit that, in the last few years, the cumulative small business was a large part of the total manufacturing volume. It is well to bear in mind that the large dealer of today was the small dealer of yesterday.

Financing is the making of all business; so it is with the electrical dealer. The question should not be: WHO should finance the appliance sale, but HOW should it be financed? If the method used today were correct, the dealer would not be looking (in vain) for assistance in carrying his deferred payments.

First, I do not feel that the utility should have any part in financing the dealer, as this financing should be done by one who is in the financing business. The utility has troubles of its own, and this straying afield would only add criticism to the utility, if it used the necessary care in determining which accounts to carry and which to reject.

Money can be borrowed if the loaner is given the necessary security. In most cases the interest rate will be governed by the type of security. When appliance paper cannot be financed, it is proof that proper security is not offered. For an example, today's plan would compare with trying to complete a loan on a house and lot when the borrower owned only the lot and had not built the house. The loan value of an appliance is the dealer's cost less the selling cost.

The financing of dealer paper, as done today, is not constructive. Under the present system, the accounts receivable of a dealer who finances his paper are a liability and, as his volume increases, he becomes a greater credit risk. The effect on the dealer of today's financing methods is the same as the effect on a child whose parents do his home work: It is a great help today, but it destroys the future.

When the dealer who is selling on deferred payments can make his accounts receivable an asset, then he truthfully can accept increased volume as an asset.

From 1915-17, I used a plan that was so designed that the banks would buy the dealer paper, but that was because the paper was not sold at a price which included the retail profit. The fact remains that a contract sale is not completed until the final payment has been made. Under this plan, and it may seem radical, the dealer buys and sells on a monthly basis: he can afford to have stock on his floor and to sell on a monthly basis. He must wait for his profit, it is true, but he thus is building on a monthly income . . . .

ROBSON J. HILGEDICK

The plan indicated by Mr. Hilgedick is being investigated by the editors. Mr. Hilgedick is a former sales manager of a national washing machine manufacturer.—Ed.

Commissioner Thomas Ends Hearing Into Oregon Utility Financial Deals

"THE only thing that was wrong with that deal was that it was started just at the beginning of the collapse of everything," said Franklin T. Griffith, president of Pacific Northwest Public Service Co., referring to financial transactions involving the acquisition of his company by Central Public Service Corp. in 1929. The deal, by which Pepco stockholders exchanged their holdings for those in Central Public Service Corp., has been under investigation by Oregon Public Utilities Commissioner Thomas and hearings were concluded on Oct. 22. The commissioner has taken the case under advisement and has promised an early decision.

The hearing has consumed more than six weeks, during which complaining stockholders and members of the commissioner's staff have sought to prove misrepresentation and illegal conversion of securities, while officers and employees of the utility and of Albert E. Peirce & Co., brokerage firm which handled the exchange and sale of securities, have constituted the defense.

Books and files of the Peirce company and files of the utility were examined for evidence, the commissioner attempting to show that the utility officials were coerced into lending assistance in the sale of Central Public Service stocks. That this was true was hotly contested, the commissioner making a point of the fact that Albert E. Peirce was head of the brokerage firm and also president of the Central Public Service Corp. and chairman of the board of Pacific Northwest Public Service Co.

Before terminating the hearing, Commissioner Thomas made five observations on points which he regarded as substantially established:

"1. That during the stock selling campaign, representations were made to purchasers that Albert E. Peirce & Co. would maintain a resale department and would buy back the stock purchased at the price paid less $1.50 commission.

"2. That a circular letter under the name of Mr. Ennis, Pacific Coast representative of Albert E. Peirce & Co., was sent out to agents and used with prospects, stating the above. This letter is referred to in the correspondence as the 'fatal letter.'

"3. That the stock of the Seattle Gas Co. was purchased by a Central Public Service Corp. subsidiary (Federated Utility Holding Co.), and sold to the Pacific Northwest Public Service Co. at $6,753,000, and that the same stock now appears on the books of the Seattle company at $459,000.

"4. That the Pacific Northwest Public Service Co. and the Portland General Electric Co. at the present time have invested in the Seattle Gas Co. and stock of the Central Gas & Electric Co., $15,016,262.

"5. That about $7,000,000 Central Public Service stock was sold and converted in Oregon before June 25, 1930, the date that it was qualified with the state corporation commissioner and a permit issued."

On these premises, it was indicated, the commissioner's decision would be based. Meanwhile, the order prohibiting further payment of the $22,000 a month service fee (EWEST, Oct. 1, p. 166) stands. An important feature of the decision is expected to be an order restricting payment under this service arrangement to the actual cost of the service, as indicated in the commissioner's enunciations in the Northwestern Electric Co. case.

Federal Commission Will Regulate

On request of Commissioner Thomas, following termination of hearings in the Pacific Northwest Public Service case, the Federal Power Commission announced that it would regulate the issue of securities by Portland General Electric Co., a subsidiary of the former. The commission claimed it could not act similarly in the case of Pacific Northwest Public Service and Portland Traction Co., inasmuch as they are not licensees of the commission. The resolution directed the Portland General Electric Co. to file a complete statement of its authorized outstanding or contemplated securities and prohibited it from issuing securities until they have been approved by the commission.

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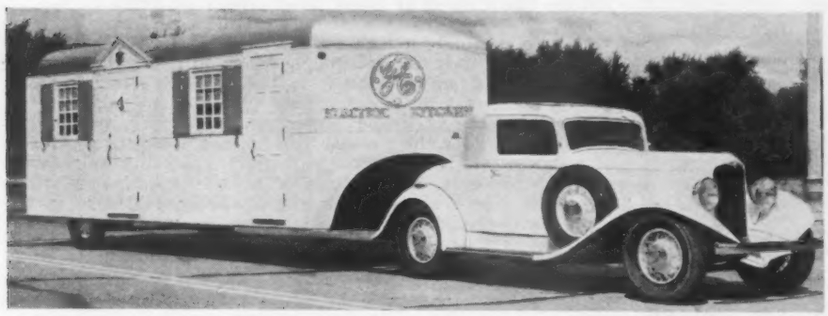
Traveling Kitchens for G.E. Distributors



GENERAL Electric Co. has ordered a fleet of kitchen coaches, such as that shown, for use by distributors of G. E. appliances throughout the nation. Tested in the East, it has proved a sound merchandiser of the all-electric kitchen, taking the kitchen right to the housewife.

It provides the usual appliances, range, refrigerator and dishwasher, and such extras as a monel metal sink, an exhaust fan, an electric clock, toaster, percolator, waffle iron, flate plate ironer, washer, radio, sun lamp, vacuum cleaner and other small table appliances. Nela Park lighting authorities have designed the scientifically-correct illumination. Even re-designing of kitchens will be done on the coach, a desk having been included for that purpose.

These coaches are expected to be a big stride toward the educating of the housewife in the appreciation of the electrically-equipped kitchen, and soon will make their appearance in western cities where G. E. distributors are located.

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Specifications Published On Aqueduct Project

Proceeding with their work so as to be ready to start construction when and if the government advances the necessary funds, Metropolitan Water District's board of directors have published specifications and called for bids on several items in the project. The R. F. C. has approved a $40,000,000 loan, but a taxpayers' suit has halted any advance of funds at the present (EWEST, Oct. 1, p. 167).

Contractors' bids on the building of San Jacinto tunnel for the proposed Colorado River aqueduct will be opened Nov. 19. The tunnel will be one of the largest single items in the job, will take about six years to build. It is expected to cost about $10 millions.

Specifications have been approved and bids called on the construction of electrical power supply lines required in the work. Specifications call for 45 miles of 66-kv., 12 miles of 33-kv., and considerably more smaller capacity line, as well as telephone systems. Alternative bidding is provided for, one providing that the bidder furnish all material, another that part of the material be furnished by the district and, finally, that all material be furnished by the

district. Electrical energy is to be supplied by three southern California power companies (EWEST, Aug. 1, p. 79).

Prevailing Wage Scale Adopted

Adoption of a wage scale in accordance with the state prevailing wage law and authorization of the issuance of the first block of bonds for the construction of the aqueduct have been voted by directors of the water district. The amount of the bonds to be issued is $2,016,000, which is considered sufficient to get the work under way. In addition to the wage scale, the district directors will establish a rate for board and housing construction forces. A rate of $1.40 per day per man for three meals and housing probably will be recommended. The Hoover Dam board-and-housing rate was quoted in discussion of the directors as $1.60 per day. The matter of staggering the employment schedule so as to give work to the greatest number of men possible also was discussed by the district board, the directors expressing their desire to do so, but at the same time recognizing practical obstacles that must be overcome, such as the nature and remoteness of much of the work.

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R.F.C. Approves Loan For San Francisco Bridge

For the second time within a few weeks, Reconstruction Finance Corp. has agreed to advance necessary funds to speed a California project, this time the San Francisco-Oakland bay bridge. The corporation will purchase $62,000,000 worth of bonds if approval of the plan by the State Legislature is obtained; this appears certain.

Bids have been opened and contracts generally let on the $35,000,000 bridge over Golden Gate. Contract for the electrical installation went to Alta Electric Co., San Francisco, for $154,470. John A. Roeblings' Sons Co. was low bidder on the fabrication and erection of cables and accessories, at $5,855,000, but approval of the contract has been delayed by agitation to either have the Roeblings' company construct a drawing plant in San Francisco or to award the contract to Columbia Steel Co., a San Francisco firm, whose bid was $31,000 higher.

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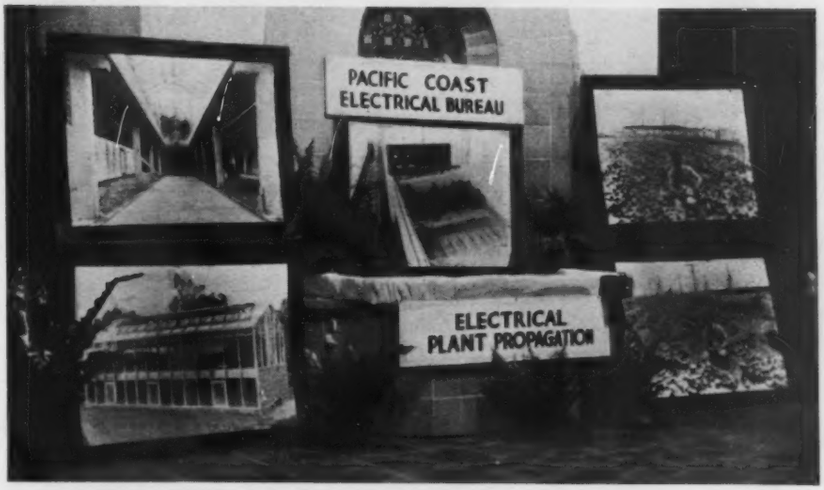
Utility Receiver Cuts Operating Costs

Net savings of $243,729.05 in operation of Arizona Edison Co. from Jan. 14 to Aug. 25, were disclosed by M. E. Cassidy, receiver for the utility, in a report filed with the Federal Court. Savings include a reduction of nearly $100,000 in management and attorney fees. The receiver removed and took from service 4,437 meters since January.

Soil Heating Displays at Nurserymen Convention



A COMPLETE working model of an electrically-heated propagating tray for hot house use and large-size illustrations of actual installations of soil heating equipment and the practical results of heating soil to speed growth were exhibited by Pacific Coast Electrical Bureau and Southern California Edison Co., Ltd., at the recent 22nd annual convention of the California Association of Nurserymen, at Riverside, Calif. George N. Hawley, Edison company industrial heating engineer, addressed the convention delegates on "Growing Plants With Electricity," and illustrated his address with slides showing the progress of soil heating in southern California.

"Considering the mildness of our climate and the corresponding low heat requirements, it would seem that the use of electricity for plant growing would reach its maximum development in southern California," Mr. Hawley said. "To this end Southern California Edison Co. and other power companies associated with the Pacific Coast Electrical Bureau have been cooperating with local nurserymen and others investigating the economics of the problem and developing satisfactory equipment for doing the job."

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Seattle Revises Bid For R.F.C. Loan

A revised request for aid from Reconstruction Finance Corp. to help Seattle's City Light put through its development and improvement program has been sent to Washington, D. C., since the R. F. C. refused to consider the former application for $7,500,000 (EWEST, Oct. 1, p. 167).

Now $3,500,000, the request does not provide for construction of a transmission line from Skagit development to Seattle, estimated to cost $2,178,517. Included in the reduction was an item of $1,800,000 needed to clear indebtedness on construction and machinery purchases for the Skagit project.

Seattle Acts for "Home Rule" Bill

Preparations are under way by Seattle's city council to campaign in Washington cities to induce the 1933 legislature to enact a law giving Seattle and other first class cities control over the service and rates of all public service corporations operating within their borders. It is a revival of the "home rule" agitation unsuccessful at the last legislative session.

The question was brought up to facilitate the lowering of telephone rates and to prevent an increase in other rates to compensate for the occupation tax which the council recently imposed on various companies (EWEST, Oct. 1, p. 167).

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Rocky Mountain Christmas Drive Opens Dec. 1

N. E. L. A.'s Rocky Mountain Division already has started work on its annual "Give Something Electrical for Christmas" campaign which officially opens on Dec. 1 and closes on Christmas eve. This cooperative activity, so successful in past years, ties in all electric utilities in Colorado, Wyoming and New Mexico with dealers handling electrical merchandise to jointly sponsor an elaborate selling program. An added feature of the 1932 drive will be a "Buy at Home" movement urging citizens of various division towns to patronize local merchants.

Nearly 200 dealers joined last year and even more extensive cooperation is expected this year, due to the broader appeal of the localized slogan. As previously, the Rocky Mountain Division will bear the brunt of the expense, furnishing free printed matter, radio programs, advertising copy and other promotional matter and services.

Los Angeles Bureau's Hollywood Office

Los Angeles Bureau of Power & Light's newly-opened Hollywood branch office is in keeping with movie tradition: It doesn't look like what it is. Without grilles or windows at the counters, with telephone dials flush at the counter, with decorative fixtures in the modern interior, the office might be that of a real estate firm—or a football ticket office, judging from the rush of business. Displays are maintained on the floor, there being no separate windows. Arthur Elliott, Bureau display manager, is responsible for the layout

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Home Appliance Exposition Before Christmas Planned by P. G. and E. in San Francisco

A THREE-to-one opportunity in the way of a home appliance show or exposition will be offered the electrical and gas industries, Dec. 13, 14 and 15, when the Pacific Gas and Electric Co. stages its Home Appliance Exposition, at the Civic Auditorium, San Francisco, combining with it an electrical industry meeting, a gas industry meeting, its own annual sales meeting, and a public exposition of domestic appliances.

First, the exposition itself, which will occupy the center or main auditorium, will be divided into two sections, one for electrical appliances, the other for gas appliances. An uniform decorative scheme is being prepared by the design and decorations committee, and will consist of Christmas colorings, with Christmas tree, Santa Claus and other holiday treatment. The display area will be treated differently from the usual show, in that, instead of each exhibitor having a booth in which to display his entire range of equipment, independently decorated and unrelated to other exhibits, appliances of each class will be displayed together.

Thus electric cookery will have a section of its own, in which each manufacturer may display one or more ranges, under a general display background carrying the Electric Cookery Council slogans and symbols. Likewise, the refrigerator section will display all makes and carry the Refrigeration Bureau slogans and selling ideas. In the same manner will be provided a washing machine section, another for ironers, another for vacuum cleaners, another for mixers. Others for small appliances and even one for electrical toys are under consideration. The purpose back of this type of display is to assemble all makes of an appliance together, from which prospects for sales can be interviewed and directed to the dealers or stores carrying the full line.

This exposition is to be open to the public all three days, with special door prize offerings and special attractions to draw an estimated public attendance of 50,000 people. Over $5,000 will be expended in advertising of all types and kinds, including radio, newspaper, billboard, car and auto banners, direct mail and bill stickers.

The second feature of the exposition is the industry meeting idea. Each year the Pacific Coast Electrical Bureau has called together all branches of the industry to a big industry dinner. At this time the work of the Bureau for the past year has been reviewed, its plans for the new year announced. At this time, during past years, it has been customary to have the Pacific Gas and Electric Co. announce its sales program for the year and review its cooperative activity and the results achieved for the industry during the past year.

Meetings of both the electrical industry, under the sponsorship of the Pacific Coast Electrical Bureau, and of the gas industry, sponsored by the Pacific Coast Gas Association and the Gas Appliance Society, will be held in conjunction with the exposition. This will bring from the entire area of northern California dealers, contractors, manufacturers' and wholesalers' representatives, as well as sales representatives of the power company. Attendance at these meetings in past years has been from 400 to 500.

Third feature of the exposition is to be the holding of P. G. and E. Co.'s own annual sales convention. This will bring to San Francisco from all of the district and division offices the entire sales personnel of the company, including the executives, department heads, agents, district managers, sales managers and salesmen. It will bring into contact with the exposition 800 company sales employees, giving exhibitors an opportunity of showing and explaining their products in a manner not often afforded.

To finance the exposition a schedule of flat tariffs has been worked out to cover all expenses, such as illumination, backgrounds, decorations, signs, advertising, door prizes, entertainment, janitor and watchman services. Small extra charges will be made for gas, electricity, water and sewer connections to operate appliances.

The exposition executive committee is headed by R. E. Fisher, vice-president in charge of public relations and sales, and includes J. P. Coghlan, first vice-president; A. E. Wishon, vice-president and assistant general manager; H. M. Crawford, general sales manager; and Al C. Joy, director of publicity and advertising. The exhibitors committee consists of B. W. Reynolds, O. R. Doerr, W. W. Clark and T. W. Hawley. The design and decorations committee is headed by Frank Bevan and includes H. N. Carroll, F. U. Naylor and W. H. Park. Other committees include a safety and liability committee, a publicity and entertainment committee, a door prize committee, a special exhibit attractions committee, a dealer and information committee, and a finance and auditing committee, on which are some of the foregoing as well as J. H. Gumz, J. A. Hill, R. O. McGougan, W. Hoskins, J. C. Jordan, W. W. Clark, A. C. Miller, W. P. Bear, John Wrenn, J. C. Manchester, G. A. Milton, E. W. Kimmell, D. G. Martin, Mary O'Donnell and A. P. Stryker.

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¶ Nov. 1 was the date set for California Railroad Commission hearing of the Tulare-Southern California Edison valuation tangle.

Westinghouse Ships Hoover Dam Material

From East Pittsburgh to Hoover Dam, Westinghouse Electric & Mfg. Co. is shipping its largest single order of electrical equipment for cableways. The shipment includes five 500-hp. main hoist and trolley motors for the five 20-ton cableways; nine motors, 75 to 150 hp., for moving the cable tower; and 33 control boards. All motors are wound-rotor, 2,300-volt, 3-phase, 60-cycle, equipped with full magnetic reversing plugging control.

Bids Called For Turbines

Bids were called late last month on turbines for six of the seventeen units of the dam power plant. Specifications call for four 115,000-hp. and two 55,000-hp. turbines, together with valves and governors for each installation. The four larger units exceed in size any heretofore manufactured.

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California Commission Cites Utility Earnings

During an investigation into rates charged by Southern California Gas Co., Pacific Lighting Corp. subsidiary, disclosure was made of State Railroad Commission figures on the rate of return of California power companies. These include:

Coast Counties Gas & Electric Co., 8.08; Pacific Gas and Electric Co., 7.44; San Diego Consolidated Gas & Electric Co., 8.23; Southern California Edison Co., 6.72; The Southern Sierras Power Co., 4.32; Los Angeles Gas and Electric Corp., 9.11.

An investigation of rates of the Coast Counties company now is in process, as is one of P. G. and E. rates. Rates of the San Diego company were reduced by about $550,000 a year on Feb. 15, 1932, while Los Angeles Gas and Electric Corp. rates were ordered reduced in 1930, but were enjoined pending litigation now before the U. S. Supreme Court.

All testimony has been taken in the hearing of the commission into rates charged by Pacific Gas and Electric Co. and a decision is expected within the month. Various northern California cities and the State Grange had asked a 6½ per cent reduction, but the company contended this was economically impossible in face of decreased electric consumption.

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Electrical Dictionary Out for Review

Just published for review and criticism prior to its submittal to American Standards Assn. for adoption, a proposed dictionary of electrical engineering terms has been completed by a committee of 120 scientists and engineers. The report, more than three years in preparation under A. I. E. E. direction, has 208 pages, lists 3,400 definitions ranging from the fundamental definitions on which the science of electricity is based to definitions for practical applications.

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Work on Wilmington Plant Proceeds

Work is proceeding, at least temporarily, on the Wilmington steam plant of Los Angeles' Bureau of Power & Light, Superior Judge Hahn having set aside the temporary restraining order previously granted Southern California Edison Co., Ltd., on grounds that the project is an illegal expenditure of public money (EWEST, Oct. 1, p. 167). The Edison company sought a temporary, later was to seek a permanent, injunction.

Judge Hahn indicated that it would not be necessary, in view of his ruling, to proceed with the trial on its merits, as asked by the private utility.

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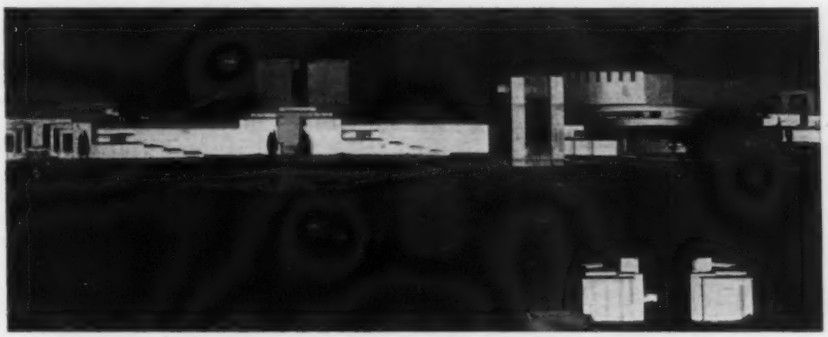
Electricity's Showroom at the World's Fair



Electricity's wizardy will be unfolded in this group of buildings at the Chicago World's Fair in 1933. Built on a man-made island, embellished with hanging gardens, steel cypress trees, electric cascades and fountains, gilded pylons and paved terraces, this 1,200x300-ft. structure is the last word in architectural phantasy. The semi-circular unit at the right will house exhibits portraying generation, distribution and utilization of electricity. In the center will be shown exhibits of telephone and telegraph communication. On the extreme left is the unit devoted to the wonders of radio and television

News Shorts

¶ AMONG items in Pacific Gas and Electric's improvement plan for 1933 will be: reconstruction of Stanislaus-Newark transmission line, $131,250; replacements on Electra-Stockton line, $40,192; and switching improvements at Stockton substation, $34,175.

¶ DEER PARK, Wash., will vote Nov. 8 on issuing $15,000 in bonds to purchase generation and distribution facilities of Public Utilities Consolidated Corp. within city limits.

¶ RIO LINDA, Calif., farm bureau is studying plans for acquisition of a municipally-owned power plant.

¶ TELLURIDE Power Co. held its annual employee outing at its Beaver, Utah, generating plant, with 231 attending.

¶ PUGET Sound Power & Light Co. soon will construct new lines to Snohomish and Island counties, value $13,500. Three miles of line extension at Bush Point, also planned, will cost $6,000.

¶ SEATTLE last month refused to let unemployed work out delinquent light and water bills, $140,000 in total, and further credit extensions are up to the two departments.

¶ PASADENA, Calif., proposes that its municipal light and power department buy $200,000 in city bonds for emergency relief, if the bonds are passed on Nov. 8.

¶ IVAN Milford, president; Bud Lee, vice-president; and Neva Danielson, secretary-treasurer, are new officers of P. G. and E.'s Shasta employees section.

¶ GENERAL Electric Co. reported $2,716,967 profit for third quarter, against $9,873,879 in the same quarter last year. Westinghouse Electric & Mfg. Co. reported $2,715,122 loss for the quarter, against $992,632 profit for same quarter in 1931.

¶ ONTARIO and Upland, Calif., are studying feasibility of establishing a distribution system to be owned by the two cities, while Vancouver, B.C., considers establishment of a steam generating plant for city street lighting, although it recently approved a 5-year contract with B.C. Electric Railway Co. for the same supply.

¶ RURAL Electric Short Course, University of California, Davis, has changed its meeting dates to Nov. 28-30, 1932. California Committee on the Relation of Electricity to Agriculture also announced a change in its meeting time to Wednesday afternoon, Nov. 30.

P. C. E. A.

Commercial Section to War on Rackets

ACUTE consciousness of the competitive power situation, a militant attitude toward the inroads of "gyp" and "shyster" lamp and lighting equipment sales rackets, a determination that power rate schedules must be formed in terms more easily sold to the public, and a keen interest in the range and refrigerator campaigns of the industry marked the two-day sessions of the conclave of the P. C. E. A. Commercial Section, held at San Francisco, Oct. 6 and 7. Harry Carroll, manager of electrical sales, Pacific Gas and Electric Co., chairman of the section, presided. The sessions likewise were unique for a complete absence of the superficialities and mental sparring so common to industry meetings of three years ago. It was a sober, serious, determined group of men, and the sprinkling of what one man termed "gold braid," executives of importance, in attendance, was far larger than for some years.

Competitive power aspects, resulting from demoralized agricultural situation, the wide expansion of the natural gas distribution and the heightened activities of engine manufacturers, absorbed much of the conclave time. An outgrowth of field experience in combating the threats of lost load to gas engines was unanimity of opinion that the present types of demand rates, with minimums based upon horsepower connected, must be revised. The executive committee of the commercial section petitioned utility managements, through the association, to hold individual company conferences between rate department engineers, accounting department and commercial department executives, particularly in the agricultural field, for the purpose, not of reducing rates, but of revising their form so that they may be more readily sold and justified to power users.

P. M. Downing, vice-president and general manager, P. G. and E. Co., and chairman, National Sales Section, N. E. L. A., addressed the Thursday luncheon, told of the aims of the national sales section and declared that the public has become accustomed to expect rate reductions from utilities. These, although demanded nowadays, are impossible to grant until greater sales of load bring them about naturally. Another force acting upon utilities to force rates to ever lower levels is competitive power. Greater efficiencies, more sales and (as a later result) more power development must contribute to this public benefit of lower rates.

R. E. Fisher, vice-president in charge of public relations and sales, P. G. and E. Co., president of P.C.E.A., spoke at the opening session, setting forth the commercial section objectives for the year as the development of a rewiring and modernization program for the industry, the extension of cooperative thinking to all of the commercial problems of the industry and the selling of the association to more of the utility company employees.

W. L. Frost, vice-president in charge of sales, Southern California Edison Co., and Pacific Coast division chairman, Electric Cookery Council, outlined the plans for local tie-in with the three-year range plan. Dr. G. W. Allison, field representative, National Electric Refrigeration Bureau, gave two stirring and heartening talks on the benefits derived from the cooperative refrigeration activity. John Wrenn, P. G. and E. Co., outlined some of the local benefits from the air conditioning committee work and refrigeration bureau activity and pointed to future possibilities in joint work for the all-electric kitchen.

R. C. McFadden, Southern California Edison Co., vice-chairman of the commercial section, presided over the second day's round table session. R. G. Kenyon, newly-appointed advertising manager, Southern California Edison Co., (See PERSONALS) opened the session with the subject of refrigeration sales. Dr. Allison was asked numerous questions as to practices of other localities.

A. M. Frost, manager of agricultural sales, P. G. and E. Co., past-president of P. C. E. A., gave a most comprehensive analysis of the agricultural power problem of the present day, cited its major sources of load, projected future load possibilities in insect control by light, soil sterilization, frost damage prevention in orchards, electrolytic purification of fruit juices and milk, and mobile farm power. He then plunged boldly into the problem of competitive power and the farmer reaction to present demand charge rates. Farmers, he pointed out, today are an intelligent class, often know more about machinery than farming, can run engines. Ben Moses, secretary, Committee on the Relation of Electricity to Agriculture, following up Mr. Frost's remarks, said that the future of agricultural power was not entirely wrapped up in rates or utility contact, but in what the farmer has available to spend. He said that farmers should be amply powered but not overpowered, that smaller motors operating at longer periods would help solve both the demand charge problem and the utility load factor. E. G. Stahl, commercial manager, San Joaquin Light & Power Corp., showed how agricultural salesmen's compensation based on kilowatts connected tended to overload rural customers and thus bring dissatisfaction with electric service.

J. W. Wrenn led a discussion on air conditioning in which H. L. Lincoln, engineer, Union Ice Co., pointed out the mutual interests of ice companies and electric utilities, the use of ice in air conditioning being likened by him to a storage of power, in that ice machinery in an ice plant operates at excellent system load factor, whereas individual compressor installations operate for short periods only. The P. C. E. A. air conditioning committee chairman, Frank L. Moon, Los Angeles Gas and Electric Corp., disclosed that this year's work would be devoted to preparation of salesmen's training and to methods of promoting "comfort cooling."

Frank Bevan, display manager, P. G. and E. Co., provided an unique luncheon treat by showing how his company has strengthened the "Weak Link in Appliance Merchandising," namely, window display. His remarks were graphically illustrated by means of actual window displays set up and lighted by the cooperation of William Wuelker. Mr. Bevan pointed out the advantages his company has found in being able to tell the same story in the same words by means of its "silent salesmen" in every one of its 70 district offices through his syndicated window display.

In relating to the executive committee their plans for the year's committee effort, the lighting bureau declared war on shyster lighting equipment and lamp selling through a comprehensive program of lighting talks, personal calls, and more interesting still, "secondary stores." The latter are stores selling colored yard goods, home furnishings and the like. Talks are to be given to their employees on the necessity for correct lighting for customer satisfaction with colors, fabrics and furnishings, and the part they can play by emphasizing this need for good light upon their customer. Full report of bureau and committee objectives for the year will be given in the next issue of EWEST.

Only one more conclave will be held this year, and that in Los Angeles, probably on Mar. 9-10, 1933, with R. C. McFadden in charge of the program.

Oldest Refrigerator

This Leonard refrigerator, after 51 years of service in a Stockton, Calif., home, was purchased for $500 by Leonard Refrigerator Co. as the oldest of its units in service. Examining the box, left to right, are: R. G. Nelson, factory sales staff; R. R. Ludington, assistant to sales manager; Max Romig, assistant advertising manager; R. I. Petrie, general sales manager; and Albert M. Taylor, merchandising director, all of the Leonard company

Engineers Concentrate on Operating Problems

SUCCESSFULLY adapting itself to the new schedule of two meetings per year, the P. C. E. A. Engineering Section accomplished much in the way of tangible results at the San Francisco meeting, Oct. 19-21. Since early in the summer R. G. Boyles, chairman of the section, has been working with his committee chairmen to plan and coordinate section activities so that preliminary organization details usually taken up at the first meeting were disposed of well in advance of the usual schedule, leaving the way clear for constructive work at the first conclave.

In all committees, the predominance of operating problems in this year's investigations was apparent. Contributing to this is the low ebb in construction activities as well as the demand for increased economies in operations. Committee plans indicate that valuable data will be compiled to this end before the close of the year's work.

Meetings were characterized by an unusually good attendance and by spirited discussions of many of the subjects under investigation. A feature of the three-day session was a dinner at Stanford University, followed by a demonstration of the new 3,000,000-volt lightning generator recently installed at Ryan Laboratory, under the supervision of Prof. A. S. Carroll, of Stanford, and B. Cozzens, research engineer of the Los Angeles Bureau of Power and Light. This meeting was part of the regular program of the San Francisco Section of the A. I. E. E., which invited Engineering Section delegates to participate.

At the general luncheon held Thursday, Oct. 20, H. J. Brunnier, consulting engineer on the San Francisco-Oakland bridge, described details of that tremendous structure, illustrating his talk with slides prepared to show construction methods and comparisons of size with well-known projects and structures.

OVERHEAD SYSTEMS COMMITTEE

W. E. ROW

Southern California Edison Co. Ltd., Chairman

Plans of this committee for the year are to devote a large part of the activities to those subjects which deal primarily with economics. Among these will be an investigation of proposed changes in existing regulation, a study of those which will effect operating economies, and those which influence operating problems.

The subcommittee on distribution economics and construction plans to collect data preliminary to obtaining an economic balance between the investment in copper, transformers, etc., in distribution lines. An investigation of the feasibility of the overhead network will be carried on; one member company, having investigated the possibilities of this design in a certain area, has decided on a trial installation in the near future.

A study of insulators will be continued along the lines of establishing a uniform method of measuring radio interference produced by insulators and of investigating the action of fog-type insulators under various conditions of contamination and atmospheric moisture. The latter investigation will be conducted in the laboratory and will be coordinated with the radio interference study.

Lightning protection of distribution lines will be subject to scrutiny to determine practices and experience of member companies to culminate, if possible, in a determination as to whether the present expense for lightning protection is justified and whether additional expense is warranted.

An investigation of the practices in pole line construction is being made primarily with the idea of studying existing regulations and from which recommendations for proposed changes may emanate.

ACCIDENT PREVENTION COMMITTEE

H. B. WELLS

Los Angeles Gas and Electric Corp., Chairman

Activities of this committee for the coming year may be summed up in the statement that there will be an attempt to compile and exchange safety information available in the various companies participating in the P. C. E. A. activities. Each member company has developed safety tools and technique in practically all departments and the accident prevention committee hopes to assemble this data so that a comprehensive survey of safety methods will be available to every utility. Also, the importance of accident prevention in personnel morale and in strengthening public relations is being stressed. One important activity is the education of the general public to the hazards of metal kites and kite strings of metallic construction. A campaign to acquaint children and parents with the danger of this practice is being conducted by the committee and it is hoped to reduce accidents from this cause to a minimum during the coming kite season.

ELECTRICAL APPARATUS COMMITTEE

B. D. DEXTER

Pacific Gas and Electric Co., Chairman

Work of the electrical apparatus committee will be directed toward operating problems. Subcommittees are set up to accomplish this end and these have been limited in number so that work will be done in as thorough a manner as possible. One such committee is investigating the costs of handling and treating insulating oils with the various types of equipment and methods available to the Pacific Coast utilities. Work of this subcommittee will consist of:

1. Obtaining general information on general practice and equipment.
2. Costs of oil treatment with the various types of equipment in use.
3. Relative importance of costs as compared with capacity, quality and other considerations.
4. Tests of new types of equipment, including treating costs, operating features, probable trouble, quality of product, actual net capacity, portability, etc.
5. Relative costs of providing spare oil at substations and power houses, including a study of drum vs. storage tanks, piping systems, quantities of oil to be kept on hand, distribution over the territory.
6. Operating troubles with pipe lines and storage tanks.

It is planned that the study of the subcommittee on economics and application of automatic tap-changing equipment will include the use of automatic tap-changing equipment for (a) power factor control, (b) phase-angle control, (c) voltage control. The following subdivisions of the subject will be covered:

1. Economic advantages of tap-changing equipment for power factor and phase-angle control.
2. Economic features of tap-changing equipment in voltage regulation.
3. Installations of tap-changing equipment in this area.
4. Operating and maintenance problems.
5. Suggestions for improvements of design from the standpoint of the central station.
6. Suggestions for a "standard" specification covering auxiliaries and accessories used in connection with tap-changing equipments.
7. Industrial applications.
8. Application to medium voltage networks.

PRIME MOVERS COMMITTEE

V. F. ESTCOURT

Pacific Gas and Electric Co., Chairman

Before the fall meeting of the prime movers committee, copies of all reports, final and preliminary, had been circulated among the membership and this added materially to the value of the discussions and the success of the meeting. Progress reports were submitted by subcommittees on condensers and auxiliaries, heat balance and plant betterment, instruments and automatic control, plant management, and operating and maintenance practice.

The subcommittee on condensers and auxiliaries presented results of a survey of condenser tube corrosion problems, a comparison of results obtained with different makes of condenser tubes, and results with chlorination equipment on the Pacific Coast. Considerable interest was shown in this report and it was felt that the subcommittee should be encouraged to enlarge the scope of its investigation of this important subject.

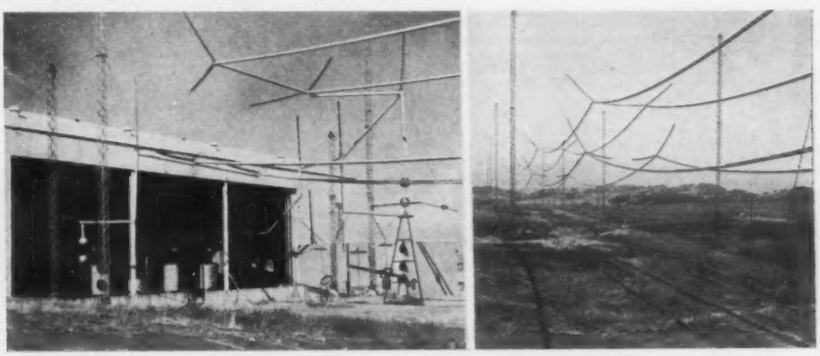
H. G. Thielscher, mechanical engineer, Stone & Webster engineering corp., gave an interesting talk on central station design and operation, with a review of present practice in its relation to future development.

METER COMMITTEE MEETING

F. A. REDDING

Southern California Edison Co. Ltd., Chairman

Secondary meter installations have aroused a great deal of interest and their study will be a major activity of the committee this year. A progress report on this subject was presented and in the discussion the use of the new sequence for meter and service switch, for the prevention of tampering, was favored. A committee is now working on a redraft of the rules of the State Industrial Accident Commission. There is a tendency to get away from tradi-



P.C.E.A. engineers journeyed to Stanford University to see the lightning generator which employs a condenser made of four sheet-metal tubes (right), each 12 in. in diameter and 1,050 ft. long. Rated as the largest of its kind, the equipment produces a 3,000,000-volt bolt with 20,000 watt-sec. of energy. Transformers and spark gaps may be seen at the left

tion and to revise the rules to meet present-day conditions. Local inspection departments are not opposed to the use of the new sequence as applied not only to self-contained meters, but to installations equipped with current and potential transformers as well. The meter committee, Engineering National Section, will send out to member companies a report on outdoor metering.

Under the head of operating problems of meter departments, the following subjects were taken up: education of metermen, off-peak metering, watt-hour meter jewels and demand meter maintenance. Off-peak metering is not included in the schedules of most of the California utilities, except to the extent of eliminating off-peak demands through the use of graphic meters and time switches. A case was reported in which a time switch was used for cutting out one element of an electric water heater during peak hours.

Two methods of testing watt-hour meter jewels were compared. One was by use of a friction torque increasing device which measures the resistance offered by the jewel bearings The other method was by use of microscope and needle point.

The report on the influence of instrument transformer secondary leads indicates that there is very little error introduced into the metering where a reasonable length of leads is used. Investigation of power factor errors in small meters shows that the present meter is not affected to any great extent by induction loads.

An interesting report was presented on the development of a rapid method of measuring the voltage ratio and phase angle resulting from the resistance and leakage reactance of phasing transformers used in Rkva. measurement.

A paper was presented in favor of the use of the thermal ampere demand meter rather than the indicating watt demand meter. It was suggested that in view of the good voltage regulation now existing, such a meter would be equivalent to a volt-ampere demand meter.

At the round table discussion, subjects covered were rotating standards for checking field standards and potential lamp indicators for watt-hour meters. Mr. Redding reported on the Chicago meeting which he attended during the first week of October. He also visited Sangamo and Duncan factories, where he inspected the manufacturing processes in operation.

FOREIGN SYSTEMS COORDINATION COMMITTEE

C. M. LINDSLEY

The Southern Sierras Power Co., Chairman

Committee work has been divided in four sections covering the following topics:

1. INDUCTIVE COORDINATION. Current cases were discussed where coordination problems had arisen between the communication and power utilities. It was found that a satisfactory solution had been determined in each case and that the cooperative attitude shown by all of the companies had resulted in a substantial saving to all involved. Advance planning in the San Francisco area also was discussed. This method of advance planning on the part of the power and telephone companies will result in much less expensive coordination work arising in the future and consequent reduction expense and better service to customers of both of the companies. A review was given of the activities of the joint subcommittee on development and research and an outline of their organization and the work which they intend to accomplish in the future. This joint subcommittee already has published fifteen reports on coordination problems.

2. POWER COMPANY COMMUNICATION SYSTEMS. A communication problem of considerable importance has presented itself since the power companies have made a practice of centralizing the bookkeeping of consumers' accounts at one head office. This method of keeping the accounts has resulted in an increased demand on the communication system for prompt and efficient service between local and division offices and headquarters. This problem was discussed in detail and methods given by which several of the companies had solved this problem without any considerable addition to their communication systems. Another problem discussed was the matter of making bridge tests on power company communication circuits where such circuits were exposed to the inductive disturbances with the consequent accumulation of voltage to ground and its effect upon bridge measurements. One company has devised a filter circuit which eliminates the effect of such voltage on the measuring equipment and, thus, bridge tests may be made in the same manner as on any telephone circuit.

3. RADIO COORDINATION. This subject provoked much interest and discussion. The topics taken up included radio interference from pin-type insulators, suppression of interference by means of filters in distribution and transmission circuits, radio complaints and costs, short wave interference and comparative responsibility of utilities, dealers and manufacturers. A demonstration was given of a new type of receiver which includes a shielded RF transmission line from the antenna, resulting in the complete elimination of all pick-up load of any kind at any point on the system except the exposed portion of the flat-top antenna. Several of these systems now are on the market and their general use should result in a substantial betterment in radio reception. Thus, work along the matter of dealer and manufacturer responsibility is bearing fruit.

4 COMMON PRIMARY AND SECONDARY NEUTRAL. This discussion included data on the operation of common neutral systems where such systems have been installed. It was found that technically this practice may now be considered as having a very definite place in power distribution and that, with proper cooperation on the part of the utilities involved, there should be no trouble from the standpoint of inductive interference. A number of cases were cited where the installation of a common neutral system had resulted in considerable savings on the part of the power utility; while, in places, some work had been necessary on the part of the telephone companies, still the overall benefits from the common neutral system are considerable where such a system is economically feasible.

HYDRAULIC POWER COMMITTEE

HAROLD K. FOX

San Joaquin Light & Power Corp., Chairman

Three carry-over subjects were covered in the morning session of the meeting, namely:

1. Mechanical reliability of hydro-electric units.
2. Current research and practice in hydro-electric development.
3. Economic phases of existing hydro-electric plants.

The data for these subjects is usually not forthcoming until about the first of the year and, therefore, very little time was devoted to details. No great amount of material had been submitted by members of the committees, but considerable is on the way. These subjects are all of an operating nature and every effort is being made to interest the operating divisions of the central station companies.

Due to the lack of activity in hydro-electric construction, the committee is taking advantage of the opportunity to review the work of the past, much of which was done under rush conditions and during periods when no one had time to study the results to as great an extent as desired.

After the subjects were disposed of, an hour was spent in very interesting discussion of several subjects, all of which would be properly inclusive under the above headings. Ray Quick, of the Pelton Water Wheel Co., gave a description of surge control devices and promised material for the reports. George W. Hawley, of the State Engineer's office, talked on his work in charge of the investigation and approval of the dams in California. Over 700 dams have been investigated and Mr. Hawley gave some statistics in regard to them which undoubtedly never had been available previous to this investigation.

UNDERGROUND SYSTEMS COMMITTEE

G. LESLIE HILL

Pacific Gas and Electric Co., Chairman

Corrosion of the lead sheaths of underground cables was reported upon, slides being used to describe the various types of corrosion due to both chemical action and electrolysis. Photomicrographic slides were shown to picture the crystalline structure of lead sheaths with different amounts of alloys added to the lead, and also to show the effect of molecular strains and welds in the lead sheaths. Additional investigations will be made, as it is realized that improvements in lead sheaths have not kept pace with the recent improvements in insulation of high voltage cable.

The performance of lead-covered cable under varying loads was presented by means of charts and curves of the load on the cables, temperatures of the ducts, sheath and the surrounding ground. Calculated conductor temperature was shown and it was found in the survey that a hot spot existed in the duct runs; this limited the amount of load that could be carried by the cables. By a better distribution of load on the cables, it is possible to reduce the hot spot temperature.

On the study of various types of low cost underground construction, information has been obtained from the different geographical sections on the types in use, and will be correlated with what has been done on the Pacific Coast. It is expected that a type of low cost underground system will be evolved which will compare very favorably with the overhead type of construction in high-class residential districts.

Of the problem of transformer vault ventilation, much can be gained by an interchange of design data and operating experiences on this subject, inasmuch as the transformer capacity being placed in vaults is increasing continuously.

Trend in the practice of network systems throughout the United States was reported upon. Considerable discussion on the various methods used on different systems ensued. Clearing of possible faults in network systems has been given very serious study, the present trend being to limit the size of the secondary cable to a maximum of 500,000 circ. mil. Moving pictures of burn-off tests were shown and a description of the tests given.

A committee in making a systematic study of the gasket problem and will report at the next meeting. When transformer vaults or manholes are flooded, the apparatus may be covered for several days before the water recedes, making it necessady to have thoroughly reliable protection in gaskets, some of which are not given adequate service.

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Two Lighting Schools Fulfill Their Promise

Unusually well attended, highly concentrated in information, demonstration and example, conducted with fairness to all products and manufacturers, in a manner understandable and practical, the two lighting conferences of the Pacific Coast Electrical Association, one in San Francisco, the other in Los Angeles, were considered eminently successful both by the association and by all in attendance. The distinguished faculty included Sam G. Hibben, manager, commercial engineering dept., Westinghouse Lamp Co., Bloomfield, N. J.; Helen G. McKinley, home lighting specialist, Nela Park engineering dept., General Electric Co.; and A. L. Powell, illuminating engineer, eastern division, General Electric Co. With them came almost a carload of demonstration equipment.

At the San Francisco conference, for which attendance figures now are available, the sessions were held morning, afternoon and evening of each of the five days of the conference. The morning session was a lecture and demonstration period, the afternoon was devoted to questions and discussion of the morning session data, and the evening

meetings were open to the public and were of a more general nature. The average attendance at the morning sessions was 106, the afternoon sessions 79, and the evening meetings 132, with a total attendance for the week of 1,450.

The Los Angeles conference, for southern California, was held only in the afternoons and evenings, and for only four days instead of five, from Oct. 24 to 27, inclusive. The San Francisco conference was held from Oct. 17 to 21, inclusive. A slight rearrangement and concentration of program was made for the Los Angeles meeting.

H. N. Carroll, chairman, P. C. E. A. Commercial Section, was in charge of the northern California conference, and

HARRY CARROLL
He was in charge

was aided by Robert Burrows, R. W. Buckles, Leo Gianini, L. A. Hobbs, Carl O. Martin, Roy D. Myers, George Raab, Rodney Doerr, W. P. Bear, Clark Baker, Sr., V. W. Hartley, Ed Martin, Al C. Joy, A. H. Nicholl, R. J. Holterman, F. C. Todt, W. A. Cyr, F. J. Kiefer, W. Simmons, W. S. Hanbridge, R. F. McDonald and E. W. Carew.

The southern California committee was headed up by R. C. McFadden, vice-chairman, P. C. E. A. Commercial Section, and had as a program committee R. A. Crosby, George Rankin, Frank Hansen and R. G. Lindemann; the publicity and attendance committee was headed by R. G. Kenyon and R. A. Buckby, and the arrangements committee by George Rankin and E. P. Markee. A full list of committees was not announced.

One of the features in connection with the San Francisco conference was an evening visit to the peninsula home of George Cameron, publisher of the San Francisco Chronicle, arranged through William Wuelker, who had installed the garden lighting on the extensive estate, followed by a visit to the illumination laboratories at Stanford University, under the guidance of Dr. Leland H. Brown.

Some of the important commercial aspects of lighting, as developed in the conferences, will be reported in detail in a subsequent issue of ELECTRICAL WEST, it is planned. Visitors from outside the state to the northern California conference included Ladner V. Ross, illuminating engineer. The Washington Water Power Co., Spokane, W. Van Alstyne, General Electric lamp division, Spokane, and C. W. Lange, of the Broadway Electric Co., Portland.

Personals

Edison Company Makes Important Shifts

HARRY J. BAUER was named chairman and George C. Ward president of Southern California Edison Co. Ltd. by the Edison board of directors October 18, filling vacancies created by the death of the former chairman, John B. Miller, in April, and by the death of the former president, Russell H. Ballard, in August.

Both Mr. Bauer and Mr. Ward have long service records with the Edison company. Mr. Bauer's association dates back to 1909, when he entered the company's legal department as a law clerk. Mr. Ward came to California with Henry E. Huntington and was identified with the Pacific Light & Power Corp. from its inception until its consolidation with the Edison company in 1917. From then until their untimely death, he was intimately associated with Messrs. Miller and Ballard, first as vice-president in charge of construction during the period of the company's greatest expansion, and later as senior vice-president, his position at the time of his election to the presidency.

Mr. Bauer served on the legal staff of the company for ten years and became general counsel in 1918, resigning in 1919 in order to devote his attention to the business of the (then) Pacific Gasoline Co., of which he became president in 1921. Since 1926 Mr. Bauer has been a director of the Edison company and he is also a director of the California Bank, Title Insurance and Trust Co., and a number of other corporations. He is president of the Automobile Club of Southern California, a director of the Community Development Association, vice-president and trustee of the University of Southern California and a trustee of the California Institute of Technology.

Mr. Ward, as vice-president in charge of construction, directed the expenditure of more than $200,000,000 in the extension of the Edison system of power supply. He was in direct charge of the Big Creek hydro-electric project. He has received two honorary degrees in recognition of his engineering achievements; Doctor of Engineering from the University of Southern California and Doctor of Science from Oberlin College.

Other executive officers of the Edison company include: William C. Mullendore, executive vice-president; Fred B. Lewis, vice-president and general manager; Roy V. Reppy, vice-president and general counsel; D. M. Trott, vice-president in charge of finance; W. L. Frost, vice-president in charge of sales; and W. H. Fischer, vice-president in charge of public relations.

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Smith, Kenyon Move to New Positions in Edison Co.

ANNOUNCEMENT of the appointment of Richard E. Smith as executive assistant and R. G. Kenyon as advertising manager of Southern California Edison Co. Ltd. has been made by Fred B. Lewis, vice-president and general manager. Mr. Smith and Mr. Kenyon previously were advertising manager and assistant advertising manager, respectively.

Both Mr. Smith and Mr. Kenyon have been members of the Edison company organization for many years and are widely known. Mr. Smith became associated with the electrical industry in California in 1915 when he was engaged as an illuminating engineer for the Pacific Light & Power Corp. in Los Angeles. A year later he became sales manager for the Mt. Whitney Power & Electric Co. and in 1917 was appointed Tulare, Calif., district manager for that company. After the consolidation of the Mt. Whitney company with Edison, Mr. Smith, in 1919, was appointed chief clerk in the commercial department of the latter company in Los Angeles. His appointment as advertising agent was made in 1921, with the change of title to advertising manager in 1927.

HARRY J. BAUER

GEORGE C. WARD

RICHARD E. SMITH

R. G. KENYON

CLYDE E. HOUSTON

J. I. COLWELL

Mr. Kenyon's service with the Edison company began in 1917, when he joined the organization as a clerk in the Los Angeles district office. After a year in the United States navy, he returned to the company as a clerk in the general office accounting department, and later became a salesman in the securities department. In 1921 he was transferred to the company's employment department as employment agent, and two years later became assistant supervisor of employment. Mr. Kenyon became assistant advertising manager in January, 1926.

Clyde Houston Advanced

CLYDE E. HOUSTON, directing head of the Pomona district and eastern division of Southern California Edison Co. Ltd. since 1926, has been appointed assistant commercial manager in the company's general offices at Los Angeles. Announcement of the appointment was made by W. L. Frost, vice-president in charge of sales. W. C. McWhinney is the company's commercial manager.

Mr. Houston is a veteran in the Edison organization. He has been with the company and its predecessors since 1904 and his duties have covered a wide range, including construction and engineering phases of the utility business, as well as commercial and district executive work.

After serving two years as an inspector in the overhead department of the Edison Electric Co. in Los Angeles, beginning in 1904, Mr. Houston was engaged as superintendent of construction for the Ventura (Calif.) County Power Co. He returned to the Edison Electric Company in 1908 as clerk in the Los Angeles district and during the next several years held various positions in the Los Angeles and Redondo Beach districts. His first appointment as a district manager was in 1909, when he was named to direct the Oxnard district. He later was transferred to the Redondo Beach district as manager and in 1926 became manager of the Pomona district. He was appointed manager of the eastern division, with offices at Pomona, in 1930.

Frost Names Coast Cooking Chairmen

LOCAL CHAIRMEN to conduct the activities of the National Electrical Cookery Council have been named by W. L. Frost, vice-president in charge of sales, Southern California Edison Co. Ltd., and Pacific Coast Divisional chairman of the council. The organization will function according to power company territories in this district. The men appointed follow: Geo. A. Campbell, president, Sierra Pacific Power Co., Reno; Paul B. Wilson, manager, Fresno Division, San Joaquin Light & Power Corp.; Harry N. Carroll, manager, electric sales, Pacific Gas and Electric Co.; A. L. Morairty, assistant general manager, Central Arizona Light & Power Co., Phoenix; A. E. Holloway, vice-president and general sales manager, San Diego Consolidated Gas & Electric Co.; George T. Bigelow, vice-president and commercial agent, The Southern Sierras Power Co.; H. C. Rice, manager, merchandise department, Southern California Edison Co. Ltd.; A. W. Elliott, manager, appliance display, Los Angeles Bureau of Power and Light; H. R. Slocum, sales manager, Hawaiian Electric Co., Honolulu.

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A. S. BROWN, since 1927 executive engineer for Federal Telegraph Co., Palo Alto, Calif., has become manager of Butte Electrical & Mfg. Co., it was announced last month. Mr. Brown's appointment followed the death of Paul Butte, president of the company, who died in August. (EWEST, Sept. 1, p. 123.)

E. H. PERRY, consulting engineer, Merchants' and Manufacturers' Assn. of Los Angeles, in September was elevated to the position of general manager of that organization. As an electrical engineer, he was employed by Stone & Webster in the Pacific Northwest from 1913 to 1917 in the construction of generating plants and in other public utility work. In 1917 he was called to active duty as an officer in the engineering corps of the army and later, as captain and adjutant-general, was assigned to the personnel division of the General Staff.

J. I. Colwell New Graybar Northwest Manager

J. I. COLWELL, manager of the Seattle branch, Graybar Electric Co., Inc., has been named district manager of all Graybar offices in the Northwest, it was announced last month. He will continue to have his headquarters in Seattle, reporting directly to the New York office of the company. Still other changes in the Graybar Northwest organization are: James Kelley appointed general sales manager in Seattle; Fred E. Gibson named credit manager for Seattle, succeeding C. R. Bean, who formerly was credit manager, service manager and purchasing agent; A. B. Young, formerly in the credit department at Seattle, goes to Portland as that office's credit manager.

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FRANK S. THOMAS, who for the past two years has been manager of the Northern Division of the Coast Counties Gas & Electric Co., with Pittsburg as headquarters, has been promoted to the position of manager of the Watsonville district. Mr. Thomas replaces N. E. Paulsen in that position. Mr. Paulsen now is with the Portland Gas and Coke Co., Marshfield, Oregon. William A. Clampitt, former assistant new business manager of the Pittsburg area, succeeds Mr. Thomas as manager of that division.

JAMES M. EAKINS, refrigeration sales manager, Public Service Co. of Colorado, on Sept. 10 completed 25 years of service with that and predecessor companies. Mr. Eakins began as an office boy in 1907.

Obituary

GEORGE E. KELLER, credit manager of Los Angeles Gas and Electric Corp. since Nov. 1, 1929, died at his home on Sept. 23. Mr. Keller joined the company in 1906 as a clerk, and in 1917 became chief collector. He continued in that office until his appointment three years ago as credit manager.

ALBERT E. FORSYTH, owner of Forsyth Electric Co., Seattle, died in that city recently. Mr. Forsyth was 56, went to Seattle from Ohio 30 years ago.

MISS AGNES M. REED, head of the domestic economy department, B. C. Electric Railway Co., Vancouver, was killed instantly in an automobile collision recently. Miss Reed was well known in electrical and dietetical circles, having been one of the first women to be employed by a central station for the operation of cooking schools and similar demonstration work. She had been with the B.C. company for the past seventeen years.

Contractor Dealer Inspector

Electragists Return to N.E.C.A. Designation

More clearly to define itself to the public and the trade, and in conformity with the names of other electrical industry national associations, the Association of Electragists, International, unanimously voted at its 32nd annual convention, Kansas City, Oct. 10-12, to return to the old name under which it was organized 31 years ago, namely, the National Electrical Contractors Association. The trade mark, "Electragists," however, will be retained for use with the association title by the members as identification, and for the benefit of the advertising value of the name.

According to Frank O. Sievers, Pacific Coast executive committeeman, who attended the convention, the meetings concentrated upon intimate discussions, in closed meetings, of problems affecting the contractors. Problems of trade policy, of distribution policies of suppliers, of central station relations and merchandising, the National Electrical Code and the influences being brought to bear upon it, membership and dues, legislation respecting bid peddling on government work, and other pertinent subjects were discussed.

At the open meeting Wednesday afternoon, Mr. Sievers presented a paper, "Sales Minds vs. Business Sense," which had been prepared by a committee of California Electragists. It maintained that the electrical industry is suffering from too much ill-grounded sales mindedness which has no backing in good business sense, that selling is only one department in the running of a successful independent business, and that Electragists must insist that only propositions of real profit be entered into.

Lloyd Flatland, president, and Ed Martin, secretary of the California Electragists, plan a general, one-day meeting for all Electragists and contractors in the near future, both for the purpose of hearing a detailed report from Mr. Sievers of the convention proceedings and also to discuss a number of local contracting problems and developments.

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J. OLIVER BOETTCHER, electrical contractor for Pomona, Calif., has opened an attractive new electric shop at 450 West 2d St. in connection with the George Belsey Co., distributors of G.E. refrigerators and Hotpoint ranges. The two companies share the space. Mr. Boettcher was associated for thirteen years with Connor Electric Co., of that city.

Consider Revision of California Lien Law

A statewide meeting of the California Building Congress of the California State Chamber of Commerce, held in conjunction with the annual convention, Oct. 20-21, in San Francisco, gave consideration to a number of pertinent legislative and policy questions affecting the building industry. Among these were proposals to change the laws pertaining to trust deeds, substitution of the uniform lien law for present statutes, a resolution asking repeal of the prevailing wage law, consideration of work rotation measures, proposed laws to curb speculation in buildings and lands, and measures to obtain from the R. F. C. funds for low cost home construction.

Most of the meeting was devoted to the lien law discussion, it being held by one group that minor changes in present laws will suffice and that a new statute will involve lengthy litigation to test legality and cause confusion; another group favored adopting the uiform lien law prepared by a Department of Commerce chosen national committee and used by several states. Minor changes in the latter to conform with the California constitution have been proposed. After much argument a motion was passed to submit the proposed uniform lien law to all interested groups for examination and comment.

The building congress went on record against the proposed changes in the laws pertaining to trust deeds, maintaining that to make foreclosure more difficult would make renewals of loans embarrassing and difficult, would delay business recovery by restricting credit for building, would make court action in all cases a necessity, thus serving chiefly the attorneys who propose the bill. Suitable legislative changes to the present laws were suggested as a means of correcting some of the abuses which have caused a desire for the drastic changes proposed.

A resolution was passed complaining that the "prevailing wage law," passed last year, has set artificial wage scales for the performance of public works based upon political expediency rather than natural laws of economics, has increased taxpayers' costs, and promoted the purchase of outside products made under other wage conditions. The resolution asked that wage scales be set upon schedules that were truly reflective of prevailing wages; repeal of the act and substitution of a fair minimum wage law for it was advocated.

No action was taken following a discussion of a rotation of work program, although many plans were proposed, even legislative action for a 30-hr. week, not only for labor but for machines. It generally was felt that the problem was one for cooperative effort rather than for legislation.

A motion, asking for a committee to study means to curb speculation in buildings and lands and establish appraisal bureaus as an encouragement to home ownership, was passed. Another motion requested the state Immigration and Housing Commission to act as intermediary to obtain from the Reconstruction Finance Corporation funds for the building of small homes for working people under low interest financing. Support was also accorded the American Institute of Architects' request to the Federal government that local private architects be employed in the design of local governmental buildings because of their acquaintance with climatic conditions, building materials, culture and architectural traditions, factors of which Washington bureaus have exhibited embarrassing ignorance.

The congress was presided over by Gordon Kaufmann, architect, chairman.

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"Hobson's Choice" at Santa Barbara

Quite the reverse of Hobson's coal-barge odds were the pleasure- and health-giving choice tendered Santa Barbara, Calif., youngsters when Harry V. Dobson, city electrical inspector—and host to the inspectors' association convention, Sept. 12 to 14, by the way—lighted Pershing Park with 20 reflectors, each housing three 1,500-watt lamps. Mounted on 70-ft. poles at six points around the field, the lighting covers an area large enough for a football gridiron, or four indoor baseball fields. A total of 90 kw. is connected

SCHOOLEY ELECTRIC Co., wiring and fixture contractors of Stockton, Calif., reduced overhead by moving to the home of its proprietor, Fred T. Schooley. The move was from 327 E. Minor St. to 1325 N. Lincoln St. The home has a large basement which is being fitted up by Mr. Schooley as a shop and a fixture display room. The office itself is maintained in a front spare room which has a private entrance. While operating his business from his home thus, Mr. Schooley stoutly maintains that he is no "curbstoner" because he maintains a substantial stock and conducts a profitable business and merely has reduced his overhead considerably by this move.

WALLACE ELECTRIC Co., of Vancouver, B. C., has made its third successive move to larger quarters, now being located at 852 Granville St. Specializing in appliances for use of the deaf, this company has installed apparatus in several churches in Vancouver. The company also handles radios and is authorized Canadian General Electric dealer. R. G. and J. G. Wallace, brothers, are proprietors of the firm.

"BILL" McCONNELL, pioneer electrical contractor of the Monterey peninsula, Calif., recently sold his business in Monterey to Mr. Sherke, formerly of South San Francisco and for the past several years superintendent of Mr. McConnell's shop. Mr. McConnell plans to retire from the electrical business.

GLOBE ELECTRIC WORKS, of San Francisco, recently was awarded the contract for the electrical work at Hamilton Field, near San Rafael. This formerly was know as the Marin Air Base. The contract calls for an extensive boundary lighting system, lighting of hangars and a field floodlighting installation.

PUBLIC SERVICE COMPANY of Colorado has just issued a new booklet containing its wiring and installation rules for the guidance of wiring contractors, motor men and others doing installation work.

CARL HARDY and Ben Hill, chief of the department of electricity and chief electrical inspector, respectively, of Oakland, held open house during the city's recent open house week, during which each department of the city administration entertained visitors and described to them the function of that department. In the electrical department a display was arranged including the new dual-tape fire alarm equipment which handles two calls from the same circuit at the same time. Traffic signals systems, police telegraph and an exhibit of good and bad wiring were also on display.

SUNLIGHT ELECTRIC SHOP, motor repair specialists, recently opened at 4532 Slauson Ave., Maywood, Calif. E. G. Lewis is the proprietor.

From Garage Up

K. B. May started business at 241 West First St., Claremont, Calif., operating a garage. A few years ago some space was given over to radio merchandising and as business increased Mr. May disposed of the garage and still maintains an attractive store to which he has now added appliances and refrigerators

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TWO STANDARDS BULLETINS issued by C. W. Mitchell, secretary, Southwestern Section, International Association of Electrical Inspectors, give interpretations on small portable indoor gas tube signs and on combination or "All-in-One" switch-and-meter assemblies, particularly for range wiring installations. Underwriters listings, it is explained in these bulletins, are subject to conformity with certain requirements in manufacture in the case of both the gas tube signs and the service equipment assemblies.

PINKERTON ELECTRIC CO. is the name of the new electric contracting and service shop at Culver City, Calif., located at 9039 Washington Blvd.

GREENUP ELECTRIC CO., Hollister, Calif., recently added a stock of paints to its electrical merchandise display and finds it a profitable side line.

POEZ ELECTRIC CO., of Salinas, Calif., abandoned its downtown location and now is being operated from the home of Mr. Poez.

THE JUSTRITE ELECTRIC CO., of Watsonville, Calif., has recently moved to a new location on Van Ness Ave. of that city.

KLINCK ELECTRIC CO., San Francisco, recently moved from 2225 Union St. to 2497 Greenwich.

MOTT ELECTRIC Co., New Westminster, B. C., has been awarded a contract by the provincial department of public works for a system of fence lighting at Oakalla jail, Burnaby, B.C. The company's tender of $3,527 was the lowest of nine bids submitted, the highest being $4,200. The job involves installation of a system of powerful flood lights on some 2,000 yd. of "non-climbable" fence surrounding the yard of the provincial jail. It will probably take a year to complete, as there is much concrete work to be done and this is being done by the prisoners.

Manufacturer Distributor

Foreign Lamps Draw Ire At Wholesalers' Meeting

Competition of foreign-made lamps, ventilation, appliance merchandising, trade relations and ordinances were among the subjects discussed at the quarterly meeting of the Pacific Division, National Electrical Wholesalers' Assn. at Del Monte, Calif., Oct. 13-15.

Conditions on the Pacific Coast relative to competition with Japanese-made lamps were described by R. P. Burrows, Pacific Coast manager, Incandescent Lamp Division, General Electric Company. Attic ventilation as a source business was described and demonstrated by G. C. Breidert, of the Ilg Electric Ventilating Co., Chicago, who used a miniature home to show how proper ventilation removed heat as well as fumes and odors.

Trade relations was the subject of the open meeting Saturday morning, presided over by H. L. Harper, Pacific Coast manager of Graybar Electric Co., Inc. K. I. Dazey, managing director of Pacific Coast Electrical Bureau, outlined the inception and organization of the joint gas and electric trade relations committee and introduced C. A. Swigart, field representative of the committee, who outlined the relationship of the wholesaler and his representatives to the trade relations problem.

C. A. Heise, assistant to the vice-president, Westinghouse Electric & Mfg. Co., discussed the sub-standard appliance ordinance promulgated by the Pacific Coast Electrical Bureau and also described the Bureau's standard electrical ordinance. Ralph Wiley, chief of the department of electricity, City and County of San Francisco, told of the successful workings of that city's substandard appliance ordinance and exhibited samples of hazardous appliances and wiring materials which had been removed from the market in that city.

In the golf tournament Leonard Marsh, Marsh Electric Co., Long Beach, won the Copper Cup and the Roscoe Oakes trophy, and C. B. Clendenin, National Carbon Co., San Francisco, won the Manufacturer's Cup.

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Gerard Swope Awarded 1932 McGraw Medal

GERARD SWOPE, president, General Electric Co., has been awarded the 1932 manufacturers' medal and purse, given under the James H. McGraw Award by the National Electrical Manufacturers' Assn. The citation was made in recognition of Mr. Swope's contribution to the advancement of the manufacturing branch of the electrical industry by developing a

plan for stabilizing employment through cooperative action by industries, out of which the N.E.M.A. mutual unemployment benefit plan has been evolved.

An excerpt from the citation:

"Gerard Swope, . . . confronted with the appalling tragedy of unemployment that has attended the economic prostration of this country in the past three years, . . . applied himself to the development of a plan to remove the fear of the future from the employee psychology by a mutual participation of the employer and employee in the establishment of life, disability, pension and unemployment. . . . (The Swope Plan) focused public attention upon this vital problem of our industrial civilization; and by combining the sound ideas of other students of the problem with his own, in a program of action, he brought great stimulus to the interest of industry itself in this long neglected obligation of management. He added both to the intensity and to the quantity of thought upon this subject and directed it along constructive lines."

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THE SCOTT & FETZER Co., Cleveland, has appointed Paul R. Prietsch as Pacific Coast representative on its line of Vacuette vacuum cleaners and sanitation systems. Mr. Prietsch also will handle the Keystone line of vacuum cleaners, a product of Standard Vacuum Cleaner Mfg. Co., subsidiary of The Scott & Fetzer Co. Holbrook Merrill & Stetson, Inc., have been named by Mr. Preitsch as northern California distributors. Mr. Preitsch formerly was assistant district manager of Westinghouse Lamp Co. on the Pacific Coast, and later general manager for Gordon Prentice, Inc., Seattle.

ROY D. MYERS, resident engineer, Curtis Lighting, Inc., has moved his office in San Francisco to 2899 Washington St. Mr. Myers also announces that he is distributor in northern California for Inland Glass Co.

UTILITIES Supply Co. has been formed as a manufacturers' representative organization with office and warehouse at 1860 East 15th St., Los Angeles. The firm represents: Aetna Rubber Co., Ashtabula, Ohio; American Circular Loom Co., New York; Coffing Hoist Co., Danville, Ill.; Gary Structural Steel Co., Gary, Ind.; Dongan Electric Transformer Co., Detroit; Pacific Wire Rope Co., Los Angeles; Phelps-Dodge Copper Products Corp., New York; and Railway & Industrial Engineering Co., Greensburg, Pa.

MOHAWK Tube Co., Inc., Cohoes, N.Y., has announced the appointment of Joslyn Co. of Calif. as its conduit distributor in California, Arizona and Nevada. Jobbers Supply Co., Seattle, is the Oregon and Washington distributor.

J. D. SPARKS, formerly with Bryant Electric Co. in Seattle, has become associated with Ilg Electric Ventilating Co., of Chicago.

T. K. QUINN, vice-president in charge of merchandising, General Electric Co., and P. B. Zimmerman, manager of the refrigeration department of the same company, were Pacific Coast visitors during October, conducting a two-day session of Pacific Coast G.E. refrigeration distributors in San Francisco.

E. F. GOHL, formerly Los Angeles manager for McClintic-Marshall Corp., has been appointed Pacific Coast manager, with headquarters in San Francisco.

J. W. HILLMER, of the Los Angeles office, Westinghouse Lamp Co., has been transferred to Salt Lake City as branch manager for the company.

C. D. LAMOREE, Los Angeles, has announced that his company now is manufacturing carbon brushes in Los Angeles, using National Carbon Co.'s carbon.

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Traveling Sales Office

Herbert H. Horn, distributor in Los Angeles for Gibson electric refrigerators, Meadows washers and ironers, and Tiffany Tone radios, has an effective method of bringing his displays intact to the door of his dealers. He places popular models of each of his products in a truck and drives right to the front door of the dealer's store. The picture on the left shows Mr. Horn at the rear of the truck

ONE MINUTE Washer Co., Newton, Iowa, has completed arrangements whereby O. S. Peterson Co. will handle the distribution of the washers in Los Angeles and southern California; Kaemper-Barrett Co., San Francisco, will be distributors in northern California; and Coast Sales Co., Seattle, will have the Northwest territory.

R. W. CRAMER & Co., Inc., distributors of Sauter time switches, have appointed Edward H. Bell as sales engineer in southern California and Arizona. Mr. Bell will continue to handle Jeffries transformers.

CHARLES J. REILLY has been appointed manager of household appliance sales for Holbrook, Merrill & Stetson, Inc., distributors of electric and household equipment, with headquarters in San Francisco.

Market Review

California and Intermountain—

OCTOBER electrical business did not generally maintain the September level, when several unusually large orders were billed, but was considered fairly satisfactory, and with better prospects ahead, the tone of the trade is decidedly more optimistic than at mid-year. Election, of course, is a powerful factor for delay, and the inertia of several poor seasons must be overcome before the holiday season may be considered successful, but the excellent demand for high-grade merchandise during the recent opera season in San Francisco and Los Angeles is evidence that there is plenty of latent retail business.

Railroads report more carloads of clothing and food, but little increase yet in electrical building material. Such gigantic projects as the two bay bridges in the San Francisco area and the Metropolitan Water District in Los Angeles now have reached the bidding and order stage. Thousands of workmen will reflect improved electrical business, first from the retailer and then upward to the factories.

Despite unprecedentedly warm weather for late October (which has hampered stock re-orders), Pacific Gas and Electric Co.'s Centawatt heater campaign has resulted in a first month distribution of close to quota, though not yet oversold.

Power company purchasing, after several very lean months, again is promising. From the northwest down to Los Angeles, the major companies have announced construction and reconstruction work, such as $200,000 for distribution lines in the Stanislaus and Stockton districts of central California. Bids are being called for mid-November for the long delayed City of Los Angeles 65,000-kva. steam plant, requiring over a million dollars of machinery.

Largest of all is the Metropolitan Water project of Los Angeles, whereon about $200,000 of transformers, $75,000 of oil circuit breakers, $50,000 of insulators, five 5,000-kva. condensers, and the wire and pole equipment for 45 miles of 66,000-volt line and 30 miles of 33,000-volt lines are now in the bidding stage, bids being due by November 17th.

Building construction records show no outstanding or even sizeable private building, but the $3,500,000 Federal Building in San Francisco is now at the excavation stage and there is a fair amount of government and municipal building almost ready for ordering.

Most encouraging is the improvement in basic industries, especially lumber, mining and agriculture. The Wenatchee apple crop, for example, has been completely marketed, and improved lumber conditions in the Northwest are reflected in the power companies' announcement of extensions and additions to their systems.

Such seasonable lines as Christmas tree outfits and table appliances are being ordered cautiously for dealers' stocks, with the stimulus of new features, such as the neon detector light for the former and low priced automatic features for the latter. About $2,000,000 of outdoor and indoor Christmas tree lights are expected to be marketed along the coast this season, despite lower prices caused by overseas competition.

Actual orders include $4,000 of G.E. turbine repair parts for a lumber plant in the Eureka district, $2,500 of Westinghouse motors for oil burners, $1,500 motors for a Nevada stamp mill and $2,500 of Westinghouse motors, controls, gearings and switching equipment for a southern California steel mill. The outstanding order also is reported by Westinghouse and covers $26,000 of synchronous motors for driving fans, etc., and a 10,000-kw. turbine and accessories for Honolulu. Manufacturers' representatives declare that the refrigeration and oil burner fields especially are active customers for their equipment, and that other industrials are showing markedly increased tendency to recondition their plants with insulating material and machinery repair parts.

Prices record lower levels, especially for steel products such as boxes, covers and flexible steel conduit. Rigid conduit, however, is firm and has even advanced a little due to the 3 per cent steamer companies' surtax on ocean freight.

Pacific Northwest—

ALTHOUGH Northwest lumber mills and allied industrial plants are reopening in increasing numbers and inquiries from these sources are comparatively heavy, orders for electrical apparatus and motors are light, and sales are confined, in the main, to second hand equipment and parts. The indications are that this condition will continue until lumbermen are satisfied that the market will become stabilized. In Seattle and other Northwest cities, building construction remains unchanged and at low levels, although more active now than during the summer months. Most of the work being done, other than Federal work, involves modernization of existing structures, minor additions to plant buildings and small homes. Unemployment in the building trades is and has been very serious, with no particular indications of early improvement.

Sales to agricultural sources, irrigation and orchard districts showed a pronounced decrease last month, but sales to mines, particularly coal mines in the Puget Sound area, decidedly were better. Central stations did no buying with the exception of a few meters and distribution transformers; sales to pulp and paper companies were for replacements only and small industrial purchases were said to be practically nil. Range sales were well maintained, as compared to the past three months, and the radio movement was reported as being from fair to good. Lamp sales, owing to seasonal demand, were good.

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Barometer

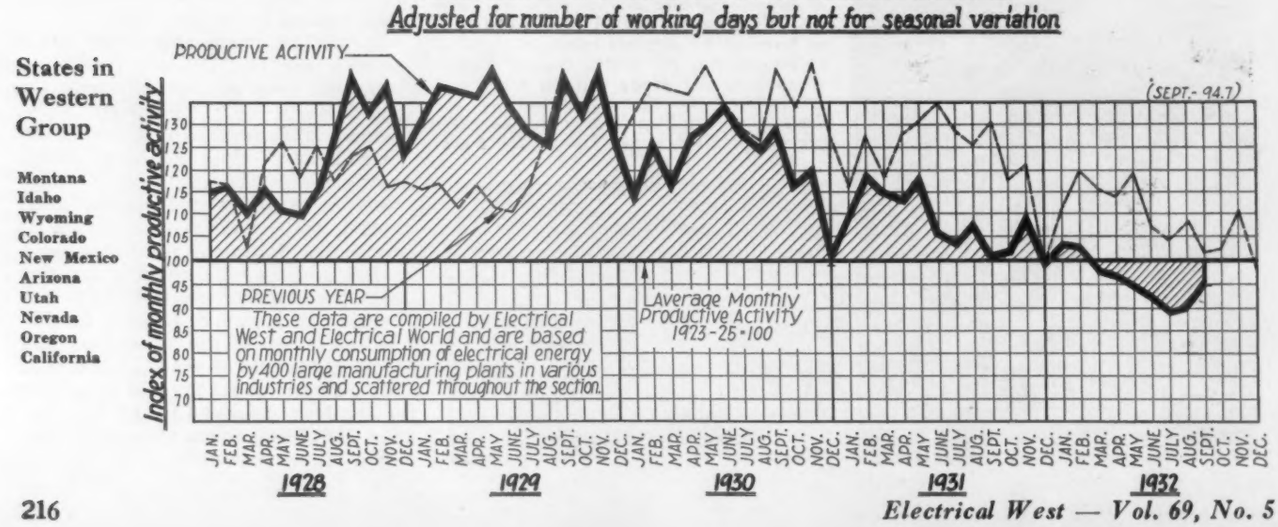
REVISIONS in the August index brings that month above July and makes September the second rising month, up 5.3 per cent. Gains in metals group are in contrast with last year's downward trend; lumber, paper and shipbuilding also show fine gains. Present level is 7 per cent below Sept., 1931, while August was 16 per cent below the corresponding 1931 month. An October rise might indicate a definite movement, the only 3-month rise since June, 1930.

Indexes of Manufacturing Activity in the Western States

(All figures adjusted for number of working days)

	Sept., 1932	Aug., 1932	July 1932	Sept., 1931
All industry	94.7	89.4*	88.7	102.3
Chemicals	84.2	85.3*	88.7	78.1
Food	115.0	113.6*	112.5	134.5
Forest products	121.2	104.8*	103.8	129.0
Metals group	38.4	35.6*	31.7	43.4
Paper and pulp	135.4	126.7*	120.0	137.3*
Rubber	84.5	92.8	103.0	115.1
Shipbuilding	108.0	96.5*	103.3	96.2
Stone, clay and glass	81.3	82.0*	79.3	93.9

* Revision.



New Products

Hotpoint Special

Through Mutschler Bros. Co., Nappanee, Ind., Edison General Electric Appliance Co., Inc., is distributing a small size electric water heater known as the Hotpoint Special. Made in 1- and 3-gal. sizes, the units will have Calrod elements, thermostatic control. One-gallon size will be 20½ in. high, 8¼ in. in diameter.—Electrical West, Nov. 1, 1932.

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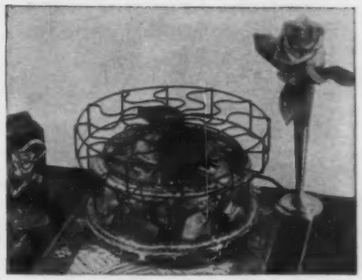
Vacuette Cleaner

The Scott & Fetzer Co., Cleveland, Ohio, have just brought out a vacuum cleaner, called the Vacuette, embodying a new invention for emptying the dust bag. This, called the Sani Em-tor, is a device at the back of the machine, beneath the bag; by removing it, the dirt falls out without shaking. Two year guarantee plus service insurance for life. Model S-J, with straight air nozzle, lists in the West at $49.50. Model S-B, with revolving brush, lists in the West at $54.50. A sanitation system with a complete renovation set lists at $84.50.—Electrical West, Nov. 1, 1932.



Ozonator

For supplying additional ozone for purifying, vitalizing and deodorizing air in rooms, Jefferson Electric Co., Bellwood, Ill., has perfected an Ozonator. Base contains ozone-making mechanism, uses current of 25-watt lamp. Fan circulates ozone in air. Base slotted for hanging; feet are rubber-padded for placing upright on table or bookcase. Price, $15.—Electrical West, Nov. 1, 1932.

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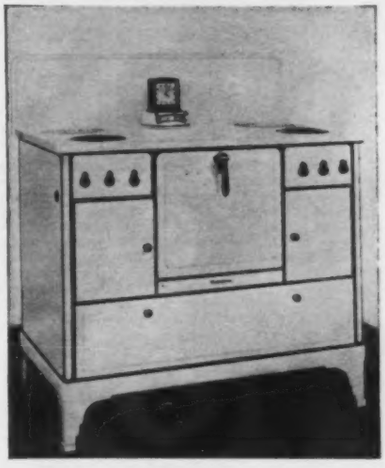
Dual Automatic



Westinghouse Electric & Mfg. Co. is marketing an electric range that will cook by the Flavor Zone method, the Maintained Temperature method, or by a combination of both. Made in table-top design, called the Dual-Automatic Flavor Zone. Four surface units, two-utility compartments which may be used as warming ovens, and two outlets provided.—Electrical West, Nov. 1, 1932.

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Egg Cooker

Landers, Frary & Clark have two new Universal appliances on the market: an automatic egg cooker and a vacuum cleaner. The former (shown) takes four eggs; cooking time is regulated by the amount of water used. If 1-min. eggs are desired, one teaspoonful of water is added; two teaspoonsful for 2-min. eggs, and so on. When water is evaporated, thermostat shuts off current and bell rings to tell operator that eggs are cooked. Chromium plated, 420 watts, price $7.50.

The vacuum cleaner has a specially-designed high speed rotary brush, adjustable nozzle, all bearing movement, and 25 ft. of cord. Retail price, $39.50.—Electrical West, Nov. 1, 1932.

Small Water Heater

For summer homes and cottages, stores, highway stands and other places where a small amount of hot water is needed continually, Clyde L. Chamblin Co., San Francisco, has developed the Aquahot, a 3-gal. electric water heater. Insulated with cork, fully automatic, thermostatically controlled. Three sizes: 600, 750 and 1,000 watts, either 115 or 220 volts. List price, $40.—Electrical West, Nov. 1, 1932.

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G. E. Junior

General Electric Co. has announced a low-priced secondary line of electric refrigerators, known as General Electric Juniors. Made in three models (4, 5 and 7 cu. ft.), the units will be of conventional design and without monitor top. To be sold with one-year guarantee. List price, 5-cu. ft. model, $135.—Electrical West, Nov. 1, 1932.

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Exposure Meter

Weston Electrical Instrument Corp. has invented a new exposure meter for use in measuring light values in photography, with a photo-electric cell as a base. Reads from 0 to 1,300 candles per sq. ft. Weighs 14 oz., is 6½x2¼x1¼-in. in size. List price, including leather carrying case and shoulder strap, $39.75.—Electrical West, Nov. 1, 1932.

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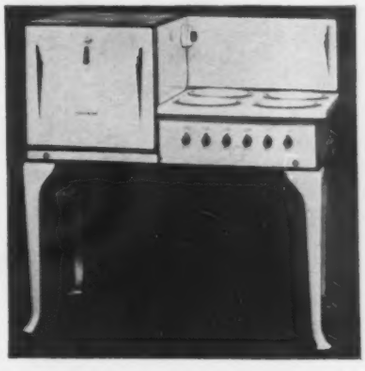
Century Range

So called because it retails for $100 or less, the "Century" range of Standard Electric Stove Co., Toledo, Ohio, is full size, with four burners. Contains most Standard range features, including heat and temperature controls, broiler and rack. Finished in ivory porcelain enamel. —Electrical West, Nov. 1, 1932.



Corox Range Unit

Westinghouse Electric & Mfg. Co., East Pittsburgh, has announced the Corox quick-cooking range unit of stainless sheet steel. In this unit, the pan, heater support and terminal straps are nickel plated. The heat elements are supported in the pan by four posts, held rigid by a center stud and the four terminal posts. All terminal connections made on under side.—Electrical West, Nov. 1, 1932.

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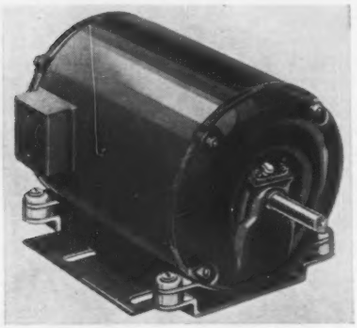
Capacitor Motor



Howell Electric Motors Co., Howell, Mich., is offering a "built-in" capacitor motor, i.e., with the capacitor box inside the motor frame. Otherwise the same as other Howell units, these fractional horsepower motors are said to be quiet in operation, without radio interference, to have high torque, efficiency and power factor, and to take less space than those with box exposed. Made in rigid or rubber-mounted horizontal types, also in various vertical types.—Electrical West, Nov. 1, 1932.

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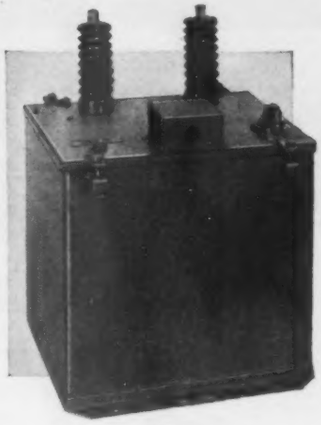
High-Water Alarm

Added to the line of pressure float and vacuum switches manufactured by Square D Co., Industrial Controller Division, Milwaukee, is a new high-water alarm for use over sump or open tanks. It consists of a single-pole pressure switch, a transformer and a signal bell wired in one unit and mounted on a 1-in. pipe. A rising column of liquid in the pipe causes an alarm to ring when the liquid reaches a dangerously high level.—Electrical West, Nov. 1, 1932.

Indoor Transformers

Allis-Chalmers Mfg. Co. announces a new line of indoor oil-filled potential transformers, designated Type PO, rated 200 kva., suitable for accurate metering service or for tripping or relay voltage supply. Features are: high safety factor in insulation strength in primary winding; liberal-sized primary porcelain; internal parts cover suspended, facilitating inspection; fixed secondary terminals inclosed in conduit terminal compartment. Available in 6,900,- 11,500,- and 13,800-volt sizes, 25 to 60 cycles.—Electrical West, Nov. 1, 1932.



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Liquid Insulator

A new synthetic insulator which has been announced by General Electric Co. is said not only to have the advantages of mineral oil as an insulating and cooling medium for electric equipment, but in addition to be non-inflammable and non-explosive. Designated by trade name Pyranol, the material is produced in different forms for different purposes, all being synthetic organic dielectrics of varying physical and electrical properties.

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30-Amp. Switch

General Electric Co. has developed a line of 30-amp. flush switches adapted for heavy duty work including Type C lamp loads. Underwriters approved. Made in single-pole, double-pole and three-way models.—Electrical West, Nov. 1, 1932.

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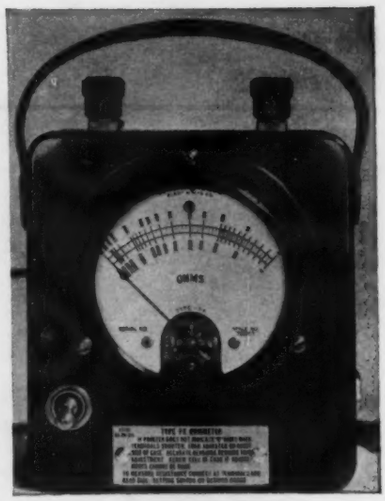
Disconnecting Switch

Delta-Star Electric Co., Chicago, announces a new 7½-kv., 600-amp., oil-immersed disconnecting switch for either underground or pole top service. An important feature is the use of a steel plate which moves down the switch blade mechanism, grounding on the steel tank and placing a barrier between the switch contacts. A surge on the live side of the switch sufficient to break down the oil, goes to ground and cannot induce any voltage on the disconnected contacts. The switch mechanism mounted on top of the steel housing can be withdrawn for inspection and, by means of bypass plugs, the load need not be dropped when the switch is removed from the tank.—Electrical West, Nov. 1, 1932.



Ohmmeter

A new double-range ohmmeter, announced by Westinghouse Electric & Mfg. Co., is a self-contained instrument which requires no external source of voltage for its operation. Powered by 1½-volt flashlight cell, has resistance ranges of 5,000 and 50,000 ohms.—Electrical West, Nov. 1, 1932.

Trade Literature

¶ DATA SHEETS—Barber-Colman Co., Rockford, Ill., manufacturers of "Barcol Midget" shaded pole induction motors, announce a descriptive bulletin and four data sheets on different types of these motors.

¶ EAGLE CATALOG—Eagle Electric Mfg. Co., Brooklyn, N. Y., announces a new fall and winter catalog of 32 pages on lamps, fuses, appliances and wiring devices.

¶ UNIVERSAL RANGES— Landers, Frary & Clark, New Britain, Conn., are distributing a catalog describing and listing the Universal range line. Improvements, new designs and prices are featured.

¶ CARBON BRUSHES—Catalog No. 13 of Boxill-Bruel Carbon Co., Columbia Park, Ohio, now being distributed, deals specifically with carbon brushes for single phase and other fractional horsepower motors.

¶ ROCK DRILLS—"Rock Drills and Sharpeners" is the title of a 32-page illustrated catalog of Ingersoll-Rand equipment. Now available from Ingersoll-Rand Co., 11 Broadway, New York.

¶ MINE HOISTS—General Electric Co., Schenectady, has prepared Bulletin No. GEA-1593 on electric equipment for mine hoists; the booklet describes motors, contactors, switches, panelboards of the company and details G.E. practice and accomplishments in mine-hoist service.

¶ WESTINGHOUSE RELEASES— Westinghouse Electric & Mfg. Co., East Pittsburgh, has released the following booklets and leaflets:

Leaflet on 100-amp., FlexArc a.c. welder.

63-page catalog (219-A) of industrial lighting equipment.

Circular 1958 on Type O De-ion Grid oil circuit breakers.

Circular 1771-B on oil circuit breakers.

45-page catalog (219-B) on commercial lighting equipment.

Circular 1960 on new metering system.

¶ RELIANCE REGULATOR— Reliance Electric & Engineering Co., Cleveland, Ohio, has issued Bulletin 602, covering the Reliance constant-tension drive for application to any process requiring a constant tension in material being wound onto or unwound from a reel.

Quick Heat
FORMER PRICE
$12.50
Now
$9.95
You'll be thankful a hundred times this winter for Quick Heat in bathroom, breakfast-nook or den. This high quality heater radiates glowing heat and it circulates heated air throughout small rooms. Because it is Doubly Effective it is economical to operate. Buy one now at a big saving.
DOLLAR A MONTH
See your dealer or
P·G·and·E·
PACIFIC GAS and ELECTRIC COMPANY
Owned · Operated · Managed by Californians

NOW
every one may have —
Quick Heat
$9.95
DOLLAR A MONTH
Why put up with chilly bathroom, breakfast-nook or den another winter? Have Quick Heat when you want it. Here is a reliable proven product, the Wesix electric heater. It is Doubly Effective. It radiates heat. It circulates heated air throughout the room. Buy one now at a big saving.
FORMER PRICE
$12.50
This new low price will only be in effect a short time. See these heaters displayed in all offices of the P. G. & E. or in your electric dealer's store.
PURCHASE NOW AT A BIG SAVING
See your dealer or
P·G·and·E·
PACIFIC GAS and ELECTRIC COMPANY
Owned · Operated · Managed by Californians

Electric Heater Sales

Rolling in by the Hundreds

November Advertising ..... More Than 3,800,000 Messages

MORE than 3,000,000 copies of 245 newspapers, 500,000 bill stickers, 70 floor displays and 36 window displays, 300,000 colorful broadsides, and 1,300 truck banners will tell, during November, the story of the new low price of Wesix Cent-a-Watt Heaters.

In hundreds of thousands of homes, in the streets, in P. G. and E. offices, in dealer windows, EVERYWHERE, the buying public will see this gigantic parade of advertising . . . . each message with its invitation to the reader to visit the dealers' stores. This advertising is certain to produce thousands of sales prospects, and to bring these prospects in your city to your store.

Every dealer has a chance to share in this business. The extent to which each will share in it depends upon the energy he shows in going after it. Tie in to these P. G. and E. advertisements with advertising of your own. Let prospective buyers know YOU are the dealer our advertisement advises them to see. Tell them where you can be found. Get your window displays and your floor displays ready to catch their eyes and open their purses.

Dealer effort that combines with *ours* in this campaign should mean the sale of more Wesix Cent-a-Watt Heaters than ever before in a similar period of time.

Quick Heat
MANUFACTURER ORDERS PRICE SLASH.....
$12.50
This electric heater is a proven product of highest quality. More than 60,000 California families have bought it at a much higher price. Buy one now at a big saving.
NEW PRICE
$9.95
This new low price will be in effect only a short time. See these electric heaters now on display in P. G. & E. offices or in your dealer's store.
DOLLAR A MONTH
See your dealer or
P·G·and·E·
PACIFIC GAS and ELECTRIC COMPANY
Owned · Operated · Managed by Californians

Quick Heat
FOR ONLY
$9.95
DOLLAR A MONTH
Safe, clean, economical to operate — this Doubly Effective electric heater. More than 60,000 now being used by California families for chilly bathrooms, kitchens, dens, or nooks that are hard to heat. Smartly constructed of shining metal that will not rust or tarnish, portable, attractive. The best heater money could buy at its former price — a great bargain at this low price.
FORMER PRICE
$12.50
This new low price will only be in effect a short time. Every home needs Quick EXTRA Heat. See these fine electric heaters at any P.G.& E. office or at your local dealer's store.
PURCHASE NOW AT A BIG SAVING
See your dealer or
P·G·and·E·
PACIFIC GAS and ELECTRIC COMPANY
Owned · Operated · Managed by Californians

P·G·and·E·

PACIFIC GAS AND ELECTRIC COMPANY

OWNED · OPERATED · MANAGED BY CALIFORNIANS

EW 111-1132

HOW TO SET A SALES TABLE FOR Christmas

SET IT UP right in your own store—the sooner the better. And set it with plenty of Hotpoint Appliances. We predict you're going to have a lot of paying guests.

And we have two sound and solid reasons for making that prediction.

Gift-seekers are going to be plentiful this Christmas *in spite of everything.* They are also going to be *practical.* They'll buy fewer useless gifts and more useful ones. That's one reason.

The other is the regular Hotpoint advertising which you've been seeing all year and which winds up in a great climax with full pages in the Saturday Evening Post, Good Housekeeping and Better Homes and Gardens. It breaks early in December—with copy that comes out four-square for Hotpoint Appliances as Christmas gifts.

And all these giveable things are wearing price tags on which are marked the lowest prices in years!

Here it is November—with less than fifty shopping days between now and Christmas. People are already beginning to browse around for Christmas gifts. They'll be out in full force in a few more brief weeks.

The Hotpoint Christmas advertising will send a lot of them into your store (whether they admit it or not)—asking if you carry Hotpoint Appliances. Be ready to say "yes." And be ready soon. See your General Electric Hotpoint distributor—right now!

● *The G-E Circle—a program of special interest to women—is on the air every day (except Tuesday and Sunday) at 6:45 P. M., E. S. T. See local newspapers for station announcement.*

THE GENERAL ELECTRIC CO., SECTION E-3911, MERCHANDISE DEPT., BRIDGEPORT, CONN.

No Need to Avoid the Issue

when Selling Monarch Electric Ranges

Exclusive Surface Unit Design Provides Both Speed and Economy

HOW does electric cookery compare with my present method—is it slower—is it more expensive? These two questions are uppermost in the mind of the average prospective purchaser of an electric range.

These are natural questions, yet their existence offers a real opportunity for the Monarch dealer. Because, he can prove to a fair minded person, beyond all question of doubt, that Monarch Electric Cookery is just as fast and just as economical as older methods—and provides many other outstanding advantages to the user as well.

Continuous use in thousands of homes, and impartial tests in the laboratory made by disinterested experts have established the speed and remarkable economy of the Monarch Hi-Efficiency Surface Unit. Its scientific design and quality construction combines the advantages of others—the speed of the "open" type and the heat retaining properties of the "closed" unit, resulting in the utmost economy of time and of current, plus extreme durability and inexpensive replacement.

A few minutes spent in study and consideration of the many sales features of the Monarch Hi-Efficiency Surface Unit will be repaid many times over as a result of increased sales. Stress these principal points when selling a prospect:

1. Only genuine Nichrome wire, which withstands a temperature of 1700F is used. Even spacing distributes heat over entire surface and eliminates "hot-spots."

2. Element is recessed in porcelain block of special refractory clay of extreme hardness and durability. Many bridges prevent wire buckling and contacting utensils. Four slots in porcelain provide for expansion.

3. Paramount insulating block, one inch thick, underneath porcelain block, prevents downward radiation and loss of heat and stores it for use after current is shut off. Liquids in a covered utensil will continue to boil from 15 to 25 minutes, due to this exclusive construction. The concave top surface of this insulating block provides a dead air space, further increasing the efficiency of the unit. This highly important feature is to be had in no other surface unit; be sure to capitalize on it.

4. Both blocks (upper porcelain and Paramount insulating blocks) are encased in a heavy pressed steel pan, porcelain enameled inside and out, attractive in appearance and easily cleaned.

5. Monarch construction provides cool terminals and freedom from corroded and burned out wires. Connections to the supply wires are outside of unit pan and away from the heat. Only three wire connections per unit.

6. Monarch units are quickly and easily removed from top for cleaning. Holes in bottom of pan provide drainage.

7. The heating wire is extremely durable, yet replacement is inexpensive—an highly important consideration.

8. Unit bricks are green to harmonize with the green marbleized, acid resisting cooking top. Stains are scarcely noticeable and the color goes all the way through the brick.

Always take plenty of time to impress the prospect thoroughly with these distinct advantages of the Monarch Hi-Efficiency Surface Unit. Point them out one by one on the cut-away demonstration sample and see how the sales resistance melts away when these exclusive features are understood.

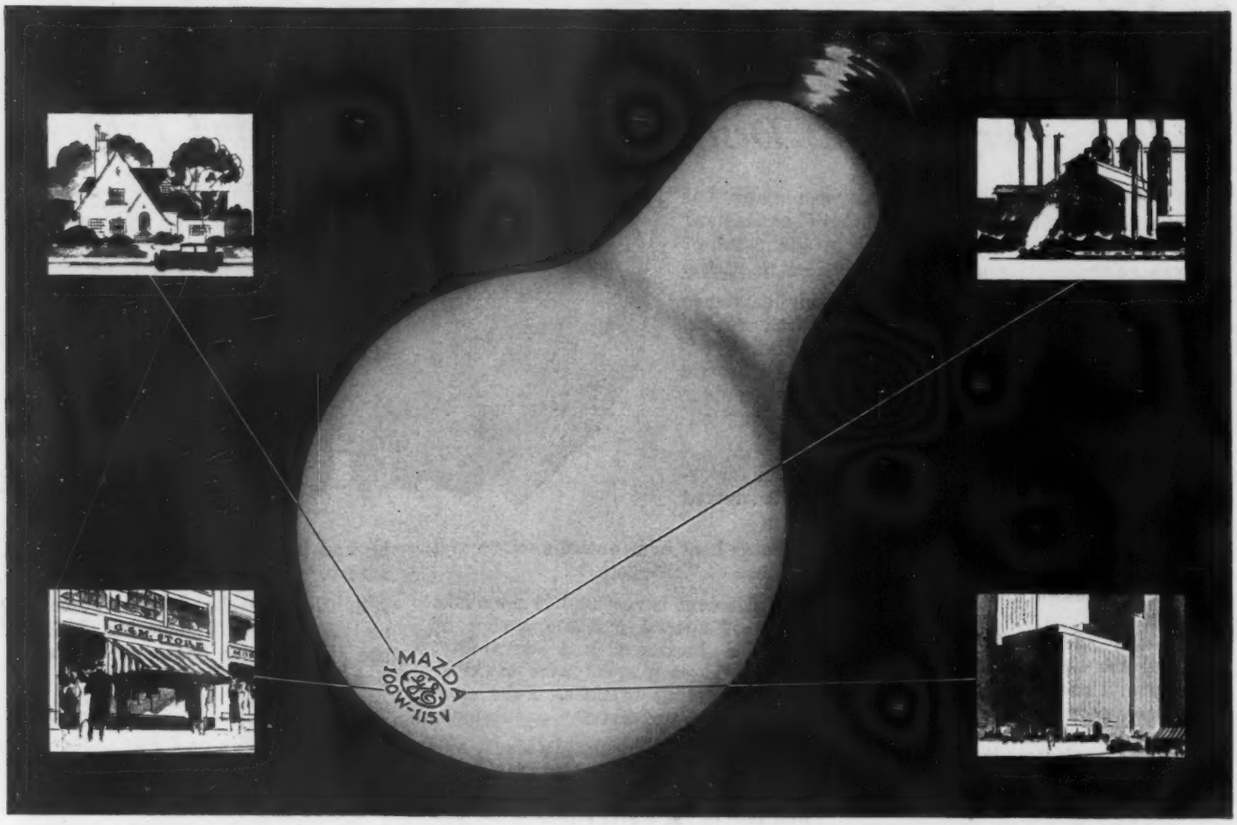
If you are not selling Monarch Ranges, let us send you a copy of the Monarch Efficiency Chart, description of our high efficiency unit, and other information on Monarch Ranges.

Monarch Visible Cookery Utensils not only help you sell Monarch Electric Ranges but provide additional profit.

MALLEABLE IRON RANGE CO.
3118 Lake St., Beaver Dam, Wisconsin

Central Station Representatives: ..... **Chamblin-Thomas Company, 639 Mission Street, San Francisco, California**
Dealer Representative: ..... **Glenn L. Brown, 3515 Kempton Place, Oakland, California**
Northwest Representative: ..... **G. A. Lieser, 1218 17th Avenue North, Seattle, Washington**

WHEREVER ELECTRIC CURRENT IS BURNED



This mark ⓖⓔ *means*

GOOD LIGHT *at* LOW COST

THE complete satisfaction of every lighting customer of the central station—from the smallest home to the largest factory—depends upon good lamps.

And the relation of good lamps to good lighting is the keynote of Edison MAZDA lamp advertising now appearing in the country's leading magazines. This advertising reaches every user of electric current—residential, industrial, commercial, and the gist of the message is this: "For good light at low cost—use Edison MAZDA lamps."

Edison MAZDA lamps are made by the General Electric Company—the oldest and largest manufacturer of incandescent lamps in the world. They embody every improvement known to lamp making science. They are subject to 480 processes, inspections and tests to insure full volume of light for the current consumed—protection against premature burnouts—against early blackening of bulbs—and against any defects that might impair their quality.

It is to the advantage of the Central Station to see that worn out, obsolete, and inferior lamps are replaced by Edison MAZDA lamps in order to insure that their customers will receive the full amount of light for the current they use.

For good light at low cost leads the way to a greater use of light—and lighting is still the Central Station's most consistent, most dependable load. That is why it pays to see that every socket is filled with good lamps—Edison MAZDA lamps. General Electric Company, Nela Park, Cleveland, Ohio.

EDISON MAZDA LAMPS

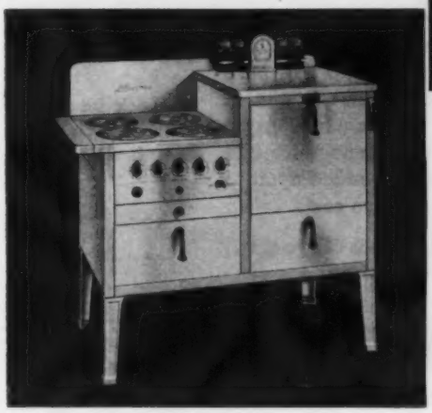
GENERAL ⓖⓔ ELECTRIC

Beauty · Utility IN THE L&H "EASIER TO SELL" LINE

Outstanding though it is, the line of ranges is only one of the reasons why *L&H* Electrics are easier to sell. Back of this line is a sound, progressive Resale Plan. And back of that plan is a thorough understanding of dealer problems and how to meet them. For *L&H* has long been a leader in distribution of electric ranges through independent channels.

Get the facts about the *L&H* line—about the *L&H* plan—about *L&H* selling assistance. Let us tell you specifically how and why *L&H* Electrics are easier to sell.

L&H *Advanced*
ELECTRIC RANGES



NO. 882 *L&H* ELECTRIC RANGE

A. J. LINDEMANN & HOVERSON COMPANY
MILWAUKEE . . . . WISCONSIN
2626 W. Washington Blvd., Chicago, Ill. 136 W. 42d St., New York, N.Y. 715 Bryant St., San Francisco, Cal.

A. J. Lindemann & Hoverson Company, 607 W. Cleveland Ave., Milwaukee, Wis.

I am interested in selling *L&H* Electric Ranges.

NAME _____

TOWN _____ STATE _____

P. F. Ross, 715 Bryant St. ..... San Francisco, Cal.
Thompson & Holmes, Ltd., 171 Bluxome St. ..... San Francisco, Cal.
Sunset Electric Company, 121 N. 9th ..... Portland, Oregon
Brown-Johnston Company ..... Spokane, Wash.
J. R. Bradley Co. ..... Reno, Nevada
Ungar & Watson, Inc., 1363½ So. Figueroa St. ..... Los Angeles, Cal.
Intermountain Electric Co. ..... Salt Lake City, Utah
Sunset Electric Company, 1530—11th Ave. ..... Seattle, Wash.
Yakima Hardware Company ..... Yakima, Wash.

Here's Help!

for Men faced with New Duties . . . .

If you are in a rut—and are satisfied to stay there—*don't* send for this book. For it's full of the dynamite of ideas. It's intended—and intended only—for men who need help in blasting their way through new problems.

Yes, this book is a catalogue—but it's no ordinary one. This 1933 Catalogue of McGraw-Hill Books is a guide to stimulating, informative works by over 1,200 leading minds in business, industry and research. In its 200 pages, you'll find clear, concise descriptions of more than 1,500 vitally important books on a wide range of business and technical subjects.

Are you concerned with Economics—or Engine Room Practice? With Refrigeration — Retailing—or Statistics? What's your most urgent interest at the moment? Somewhere, in the 120 sections of this McGraw-Hill Catalogue, you'll find a guide to the books that will help you generously in solving *your* particular problems.

No wonder this Catalogue is used every year by thousands of men who keep in the front ranks with the aid of McGraw-Hill Books. And this Catalogue is FREE. Surely you'll send for it today.

Mail This for FREE CATALOGUE O-1132

McGraw-Hill Book Company,
330 West 42nd Street, New York City.

Please send me, free of charge, your 1933 Catalogue of McGraw-Hill Books. I want to know more about: (Name subjects of most interest to you)

.....

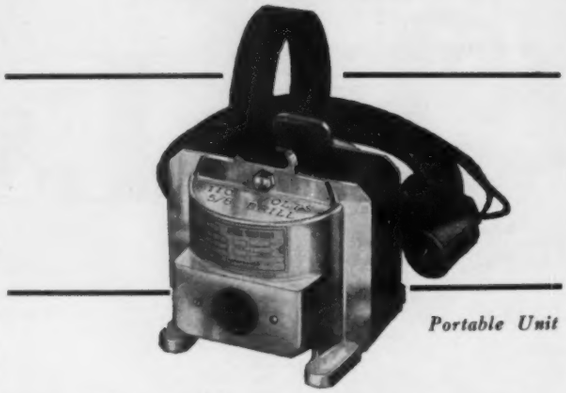
.....

Name.....

Address..... State.....

City.....

110-Volt Lighting From 440 or 220-V. Power Circuits...



Portable Unit

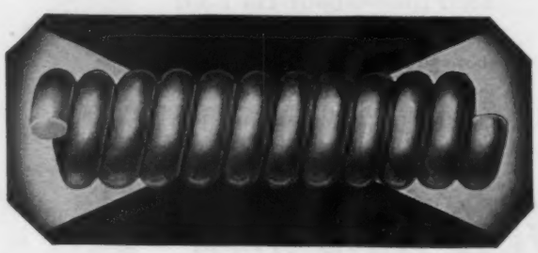
. . . This is readily accomplished with Jeffries Air-Cooled Transformers . . . Economical to install in any convenient place inside of buildings without expensive inclosures or fireproof vaults.

Prompt Service on Special Units

JEFFRIES TRANSFORMER CO.

5706 Long Beach Avenue -:- Los Angeles, Calif.

ELECTRIC AGENCIES, 2059 Webster St., Oakland



Galvanized Telephone Wire and Steel Strand

Crapo Galvanized Wire can be wrapped around its own diameter without injury to its pure zinc coating. . . . That is one of a number of reasons why **Crapo** Galvanized Telephone Wire and Strand can be depended upon to reduce maintenance cost.

Look for the **Crapo** Seal!

Indiana Steel & Wire Co.
Muncie, Indiana

INDIANA STEEL & WIRE CO. Crapo Galvanized MUNCIE, IND.

Crapo
GALVANIZED PRODUCTS

Proctor Schwartz Waffle-Iron

Telechron Electric Clocks

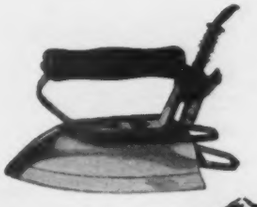
M-B French Drip Percolators

Miller Sun Lamp

Graybar Radio

Egg Cooker

Portable Electric Sewing Machine

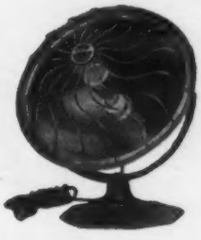


Quick-Heating Iron

The Handy Cleanerette

Triple-Automatic Range

Dual-Capacity Clothes Washer



Reflector Heaters

Two-Speed Vacuum Cleaner

For the holiday season ...and EVERY season *Graybar Appliances*

Practical people will be looking for *useful* gifts this holiday season. That's one reason why forward-looking dealers are stocking the Graybar complete line of quality appliances. Graybar appliances make practical attractive gifts.

And a word to the wise. Now is the time to begin building for the future on the basis of quality. A reputation for dependability today will mean more and more sales as business conditions improve in the future. Graybar's 63 year old *quality* reputation can help you establish *your* reputation for quality.

GraybaR

OFFICES IN 76 PRINCIPAL CITIES

Your Patriotic Duty— Vote This Year !

PROFESSIONAL DIRECTORY

BYLLESBY
ENGINEERING & MANAGEMENT CORPORATION
Wholly-owned Subsidiary of Standard Gas and Electric Company
231 South LaSalle Street, Chicago
New York Pittsburgh San Francisco

ARTHUR R. KELLEY
CONSULTING ENGINEER
Reports and Valuations, Public Utility Industrial Properties
Edison Bldg. Los Angeles

ELECTRICAL TESTING LABORATORIES
Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory
80th St., and East End Ave., New York

Your card here builds favorable prestige for you. The cost is extremely small. The value is great as a business aid.

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Contractors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

In any line, a specialist does the best job.
Why not consult the firms listed here on your next undertaking?

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Christmas Cards

ARE NOW ON DISPLAY
MORE BEAUTIFUL THAN EVER
AT TODAY'S NEW LOW PRICES

Electrical West is from the press of Neal, Stratford & Kerr

NEAL, STRATFORD & KERR
STATIONERS -:- PRINTERS -:- ENGRAVERS
521 Market St. SAN FRANCISCO 1169 Russ Bldg.

IN ALL THE WORLD there is nothing like

ELECTROTRIM!

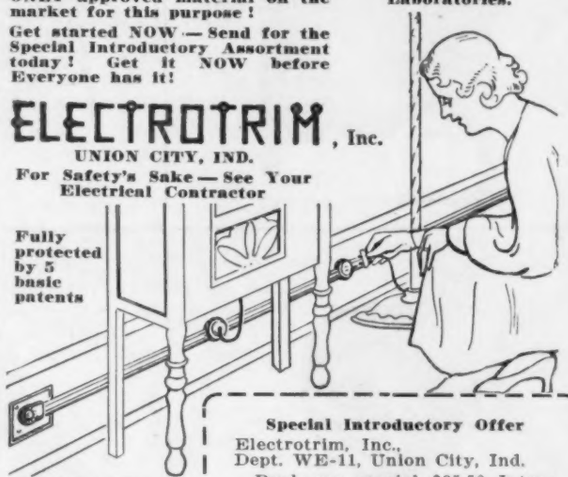
Nothing like it on the market! No imitations — no substitutes — no price cutting competitors. Nothing like it for profits — over 35% profit on material plus installation profit — few items give the Contractor Dealer and Jobber a greater profit margin!

Nothing like it for SALES APPEAL — the public wants and will buy LOW COST WALL OUTLETS to eliminate unsightly, hazardous, misused lamp cord and extensions and Electrotrim is the ONE and ONLY approved material on the market for this purpose!

Get started NOW — Send for the Special Introductory Assortment today! Get it NOW before Everyone has it!

Electrotrim is the only surface extension wiring approved by the Underwriters' Laboratories.

ELECTROTRIM, Inc.
UNION CITY, IND.
For Safety's Sake — See Your Electrical Contractor



Fully protected by 5 basic patents

West Coast Representatives: C. R. Hunt, Rialto Bldg., San Francisco, Cal. K. B. Slack, 601 So. Detroit St., Los Angeles, Cal.

Special Introductory Offer
Electrotrim, Inc.,
Dept. WE-11, Union City, Ind.
Rush me special $25.50 Introductory Assortment.
Name .....
Address .....

ORANGEBURG FIBRE CONDUIT — *time-tested in 39 years' service*

A mile of conduit to a 5-ton truck

SO light . . . yet so strong, so tough . . . Orangeburg Fibre Conduit can be rapidly handled and transported in large loads with the minimum danger of breakage.

There's one big saving. Here's another. Orangeburg Fibre Conduit lays up fast . . . forms perfect joints . . . can be rapidly, accurately aligned. For it is made up in 5- and 8-foot lengths, consistently uniform in bore, wall thickness and machining of joints.

39 years of successful service on tens of thousands of miles of electric ductways have made Orangeburg Fibre Conduit the standard underground protection for leading utility companies, municipalities and other conduit users throughout the world.

In all climates, under all soil conditions, it provides high resistance to corrosion, reduces the possibility of electrolytic or stray current damage.

• • •

Use Orangeburg Conduit on your next job. Your order will be promptly filled . . . wherever you are. One factory in Orangeburg, N. Y. — another in Richmond, Indiana, manufacture Orangeburg Conduit exclusively. Stocks in all larger cities keep transportation charges low, avoid costly delays.

The Fibre Conduit Company • ORANGEBURG, N. Y.

SOLE SELLING AGENT Johns-Manville

San Francisco
159 New Montgomery St.
Los Angeles
441 Petroleum Securities Building
Seattle
743 Henry Building

If *Santa Claus* Was Your Own Exclusive "Trade Mark"

SANTA CLAUS is the greatest merchandising trade figure that was ever conceived. The Infant New Year, the Valentine Cupid, the Easter Bunny, the Independence Day Firecracker, the Hallowe'en Jack O'Lantern, the Thanksgiving Day Turkey—all have been used to advantage in producing a background for selling products of every nature, but none compare with the sales-promotion-value of Santa Claus! Think what a Christmas shopping period would be like without Santa and his retinue. Think of going through a winter selling-season without the spirit and enthusiasm of the Yuletide gift season, of which Santa Claus is the keynote!

Here is a trade figure that is worth millions of dollars to manufacturers and merchants everywhere. If it was your own "exclusive" trade mark, you would make a tremendous effort to "put it over big" each year, wouldn't you? You would do everything you could to set the stage for the Christmas season, knowing beforehand that the more stupendous the scenery and trappings, the greater the show, the greater the box office returns! Wouldn't you? Well—*it is your trade mark*—just as much as it is anybody else's—year after year people have been building it up for you—teaching their children to look toward Christmas for Santa Claus—and keeping in their hearts a kindly regard for the jovial old fellow themselves. It's a great show—it's their show! But it's your show, too, and you can help set the stage for it this year by spreading the gospel of Christmas lighting—out-of-doors, as well as in-doors. Do some "decorating" yourself, at home and at your place of business. Tie in with the "out-of-doors Christmas tree movement"—be a part of it! Help make this an Electrical Christmas—and Santa Claus will do the rest!

Pacific Coast

ELECTRICAL BUREAU

A non-profit organization supported by all branches of the industry as an advisory bureau to serve impartially all users of electricity

447 Sutter Street, *San Francisco*

Room M. 15 Edison Bldg. Los Angeles

848 Roosevelt Street Fresno

ELECTRICITY COSTS SO LITTLE IN CALIFORNIA